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War Comes to Katanga

METALLOGENESIS knows neither political nor tribal boundaries. It so happens, however, the in the vast slice of Central Africa formerly under Belgian rule, by far the largest part of the mineral resources—or at any rate, the known mineral resources—are concentrated within a relatively small area near the south-eastern boundary in what is today the State of Katanga. In the absence of wiser statesmanship than has so far prevailed not only within the Congo itself but also in the United Nations and its member countries, this accident of mineral distribution threatens to cause a major setback to emergent Africa and indeed to civilization itself.

On strictly ethical considerations the problem of Katanga's seccession presents no clear cut choice between right and wrong, since the question basically at issue is whether the future prospects of the Congo Republic as a whole are to be sacrificed on the altar of Katangan independence, or whether Katanga's desire for independence—which, but for her mineral riches, would cause little stir in international circles—should be forcibly suppressed in the hope that Congo unity may be thus achieved. The cynic may conclude that in the present decade emancipation and self-determination have become ideals to which lip service is readily paid, provided they can be achieved without inconvenience to other political interests. Whatever its wisdom, the solution ultimately arrived at cannot be wholly just to all concerned.

Over-simplifications are dangerous, however, for the fact is that the sole unifying factor in the Congo was the Belgian administration; once Belgium relinquished the reins there was left not a nation but a conglomeration of tribes and peoples— some of them traditionally hostile to one another—whose leaders for the most part were incapable of approaching the problems of independence from the broad standpoint of a united country.

In the absence of a strong national leader seccessionist movements were to be expected as surely as the lawlessness and famine which followed the mutiny of the Force Publique and the collapse of the public services. In the ensuing chaos Katanga has been an oasis of stability, due not only to its revenue from mineral production, but also and primarily to the good sense of the Tshombe government in recognizing Katanga's continued dependence on its Belgian administrators, technicians and mining men. Up to about a week ago, Union Minière has since independence been able to carry out its operations in Katanga virtually without interruption. In so doing, it has provided a good livelihood for 20,000 African employees, besides underpinning the Katanga economy with a revenue of some $50,000,000 a year, and has continued to supply the Free World with copper, cobalt, and other essential metals.

Since the Congo—like any other country—is not inhabited by angels, few statesmen can have been naive enough to expect that M. Tshombe would willingly hand over to the Central Government, situated at Leopoldville some 1,500 miles away, control of Katanga's prosperous mining industry together with the lion's share of the revenue thereof, not to speak of the 210,000 shares in Union Minière of which both governments claim to be the rightful owners.

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Moreover, M. Tshombe's arrest when attending a conference of Congo leaders early this year and the two months he spent as a prisoner can only have heightened his fear and suspicion of a united Congo.

Yet there were powerful forces pushing Katanga in the direction of at any rate a loose federation of Congo States. Tribal warfare had cut off Katanga from many of the foods and industrial supplies it used to get from other Congo states. Inflation was rampant and prices of consumer goods threatened to go higher still. Economically, the arguments in favour of rejoining the Congo were becoming increasingly cogent. Moreover, despite all the allegations and distortions that have been bandied about, whether from ignorance or political motives, Congo unity is almost universally desired, not least by the countries and interests now widely accused of sabotaging it. Not the least regrettable aspect of the present catastrophic situation is the tendency to regard all opposition to U.N.'s invasion of Katanga as the machinations of "colonial" powers pressurized by powerful financial interests, and to label all M. Tshombe's European helpers by "mercenaries".

If, indeed. the revenue from mineral and metal production in Katanga is of critical importance to the Congo as a whole, the Congolese have cause for gratitude to the mining men who have remained at their posts and kept the mills grinding throughout the uncertainties and dangers of the past eighteen months.

The fact is that Union Minière, like any other large commercial undertaking, requires peace and order for the normal conduct of its operations. There is also the danger that revolts in Angola might close down the Benguela railway, in which case the company would be forced to curtail its shipments unless the route to Matadi was reopened. Here are two good reasons why Union Minière itself is said to favour a pact with Leopoldville, though the company is obviously in no position to express open opposition to decisions reached by M. Tshombe and his advisers.

The question at issue is not whether Katanga should be brought back into the fold, but how and on what terms this should be effected. Leaving aside such controversial considerations as to whether U.N.'s military invasion of Katanga exceeds the mandate conferred by the Security Council's resolution, it is hard to find logical justification for an action which can only have the effect of spreading into the one relatively stable province the chaos which prevails throughout virtually the rest of the Congo. Can anybody seriously believe that law and order will follow upon the extension of Mr. Adoula's writ to Katanga by the intervention of foreign troops. A much more likely consequence is to intensify and perpetuate Katangan opposition to union with the Congo in any form. Even if Katanga's resistance is speedily crushed, U.N.'s conquest may nevertheless prove a disastrous setback to Congo unity, which not many weeks ago seemed within sight of achievement by peaceful means.

Not the least ironical element in a situation which would be farcical if it were not so tragic, is that the invasion of Katanga may well have the effect of bringing costly and lasting damage to the very assets which, basically, the fighting is all about, namely the Katanga mines. From a recent statement by an official of Union Minière, as a result of U.N. bombing production has ceased at Kolwezi where the company's fuel reserves were set alight, and at Luilu because of bomb damage to the transformer station, in fact all mines and plants are reported to be practically idle. According to M. Tshombe, the air attacks on Kolwezi have "annihilated for several months the economic complex which was our pride". Kolwezi is Katanga's second city and one of the key centres of Union Minière's enterprises.

There is a possibility that still more serious damage to mines, refineries and power stations may be caused by a scorched earth policy drawn up for the Katanga Government, which is said to involve the demolition of all installations operated by Union Minière.

The British Government's dilemma over U.N.'s request for bombs illustrates only too dramatically how impossible it is to apply the normal yardsticks of political and moral judgment to a situation arising because a world authority set up to preserve world peace has committed itself to indefinite intervention in a civil war on behalf of a government too weak and divided to enforce its authority by itself. Perhaps the best one can now hope for is a speedy ending to the present disastrous situation. But even in the unlikely event of Katanga's resistance collapsing, the problems of the Congo and Katanga will be no nearer solution. They will merely have taken a different and perhaps still more intractable form.

While it is impossible to assess at present the extent of the damage sustained by the Union Minière copper facilities in recent Katanga fighting, nor the duration of the suspension of copper sales announced in Brussels this week, it is at least possible to make a rough estimate of the extent to which loss of production from the Congo can be made good next year. 1962 looks like opening with a surplus of sales over consumption during 1961 of up to 50,000 tons plus accumulated Anglo American stocks withheld from the market (their contribution to the 10 per cent cutback) of perhaps 40,000 tons while stocks in consumers hands are relatively strong. These three factors alone should be sufficient to carry a loss of production from the Congo for at least the first four months of next year.

Beyond this in very round figures it should be possible if necessary to count on additional output next year as follows :—

	tons
Cessation of Rhoanglo and R.S.T. cutbacks ...	55,000
Increased Rhoanglo production following expansion at Nchanga	5,000
Mufulira West extension	40,000
Chile	50,000
North America	50,000
	200,000

Note : The increase in production both from Rhoanglo and Mufulira West will come very largely in the second half of the year.

This coupled with the carry forward at the beginning of 1962 (see above) would just about balance the Congo's production in 1961. Against this must be set an allowance for some increase in consumption next year and also for the fact that the above estimates assume full production in countries outside the Congo which is always an optimistic assumption. This is particularly so in 1962 during which labour contracts come due for re-negotiation over a wide sector of the industry.

The Chuquicamata contract expires at the end of this year and El Teniente at the end of March next. Of equal importance are the mid-year contract renewals facing practically all the U.S. domestic producers.

The outlook in both these countries is thus far from settled, but it seems a reasonable assumption that if the stoppage in the Congo was prolonged to a point where copper was in danger of being priced out of the market, managements would be likely to pay up rather than see production come to a halt. Thus it could be that a six months' stoppage in Katanga could constitute more of a threat to the wage and costs structure of the copper industry than to availability of physical metal which hardly seems to be in danger unless the Union Minière shutdown were to be prolonged into next Autumn, either through major damage to installations or to continued fighting and political uncertainty.

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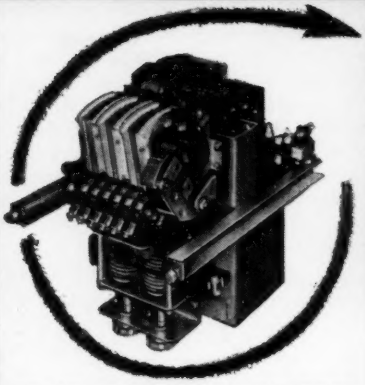

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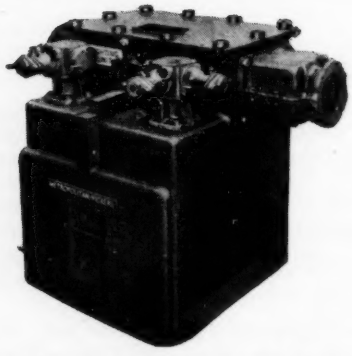

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HOW THE FRENCH DO IT

At a time when the future role of the Overseas Geological Survey in Britain's aid programme is under consideration, it is interesting to learn of a further example of direct participation in a new mining operation by its French counterpart, the Bureau de Recherches Géologiques et Minières.

This is in the M'Passa lead-copper mines in the Mindouli area of the Republic of the Congo (formerly French Congo) which has been brought into operation by a consortium to which belong both B.R.G.M. and a private company, the Compagnie Minière du Congo Francais. The mine will produce some 6,000 to 7,000 tonnes of lead annually. The opening of the M'Passa mine compensates for the closing earlier this year of the Compagnie Minière's lead mines at M'Fouati and Hapilo.

METHOD STUDY IN MINING

Mining, more than any other industry suffers from a fundamental lack of conformity regarding both products and processes. This makes the application and appreciation of method study technique a far from easy task, but the recent National Coal Board Method Study Exhibition in London was particularly informative in recording the very significant contribution that these techniques have made towards increasing efficiency in the British mining industry.

During the past six years more than ten thousand investigations have been made, not only underground but also on the surface. Studies have been made into the problems of stock yard layout, materials distribution, transport from face to wagon, tunnelling, coal face mechanization, production and cost control, management information and manpower distribution. The experience gained has shown the value of these studies and has indicated where and how method study can be most profitably employed.

Securing maximum benefit from the mechanization drive means that power loading machines must be fully utilized throughout the entire working shift, and efficiency studies have discovered many causes of delay. Bottle necks which held up transport of minerals from face to surface have been located and eliminated. The recent contraction of the British mining manpower force has, in many cases, lead to better deployment of men, and studies on capital investment have shown how money can be saved by making better use of existing resources. The problems of mechanical and electrical maintenance and the supply of materials and equipment, created by the increasing concentration of production on highly mechanized faces, have been and are being successfully tackled by method study techniques.

So far in Britain method study has been primarily used to improve existing systems but there is no doubt that it will play an important part in planning future operations.

Hand-in-glove with method study in mines is the relatively new science of operational research. This has been defined as 'a scientific method of providing executive departments with a quantitative basis for decisions regarding the operations under their control ". In some ways it is a method of approach to operational problems. The Second World War saw the emergence of operational research as a separate branch of science, and after the war, the N.C.B. was one of the first industrial organizations in the U.K. to start an operational research group. This began in 1948 and has expanded as the demand for its services increased, and now totals 46 people, of whom over half are graduate mathematicians and statisticians.

Method study and operational research can do much for mining, for nowhere is there a more fertile field of application. There is a great deal to be done and many widely diversified problems to solve. The solution of these problems is not going to be solely in the hands of mining engineers. The building up of composite groups such as operational research and method study teams is the logical approach and the success of these groups should do much to raise mining from an art to a science.

TANGANYIKAN INDEPENDENCE

At midnight on Friday, December 8, Tanganyika became the first British colony in East Africa to achieve independence. Looking to the political future of the country there is every reason for confidence, for many of the problems that have beset some of the other newly independent African territories do not appear to be present in Tanganyika. The European settler population is small and has never shown any great political aspirations and furthermore, there is a significant absence of any serious tribal friction of the type that has become familiar in the Congo. Added to these factors there is the personality of the Prime Minister, Mr. Julius Nyerere. Throughout the whole campaign for Tanganyikan independence Mr. Nyerere has shown himself to be a great believer in African nationalism; today he is respected by Africans and Europeans alike, both inside and outside of his territory.

Economically, Tanganyika is a poor country. It has no Katanga or Copperbelt and its per capita income of £20 is one of the lowest in Africa; less than half of the population has received any formal education and only 5½ per cent of its population is in paid employment.

At present some 55 per cent of the gross national product derives from agriculture whilst only some four per cent is contributed by mining. The mining income, however, is continually expanding and has increased fourfold in the past decade having reached £7,200,000 in 1960. In the first ten months of 1961 the industry's earnings are equivalent to an annual rate of £7,500,000.

The growth over the past decade is mainly due to diamonds. In 1950 the diamond production was valued at £750,000 whereas this year it will be almost £6,000,000. This growth has been due almost entirely to the Mwadui Mine of Williamson Diamonds Limited, a company which is owned jointly by the Tanganyika Government and De Beers.

Gold and diamond mining together account for some 93 per cent of the total mining revenue, and although the increase in gold production has not been as great as diamonds it has still been substantial. In 1958 the production was 56,299 ounces, in 1960 it was 98,024, and this year it will probably exceed the 100,000 ounce mark.

Looking to the future there seems little doubt about the strength of the diamond mines, particularly as prospecting has already revealed an extension of the diamondiferous deposits, at and near Mwadui. As regards other minerals a great deal of prospecting remains to be done, though as a result of government encouragement there has been, in recent years, a considerable intensification of the prospecting programme. Necessarily, much of the work has proved unrewarding but an economic coal deposit has been discovered in the Southern Province and iron ore and pyrochlore deposits have been located in the territory. Shell Petroleum are at present looking for oil and Anglo American have been conducting a systematic exploration of the Western Rift Valley since 1956.

It is significant that Africans are being encouraged to look for minerals themselves in their own areas. Already this year two pilot courses have been held for African prospectors and it is the intention to hold other courses in the future.

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NEW DEVELOPMENT IN METALLURGY

The source of this article on the theory and application of the Strategic-Udy Process is a communication by Raymond G. Brown, vice-president of Strategic-Udy Processes Inc., presented to the Congrés International de Chimie Industrielle, Barcelona, October 23-30, 1960, and published in *Chimie et Industrie*, September 1961

THE Strategic-Udy process is a new method invented by the late Dr. M. J. Udy for winning values from ores containing iron, nickel, chromium, titanium and other metals, ordinarily lost when conventional metallurgical processes are employed.

Dr. Udy, who died in April, 1959, was the holder of no fewer than 80 American patents. A number of his inventions have been commercially successful. For more than twenty years Dr. Udy sought for a means of exploiting low grade iron ores which cannot be treated by the traditional methods. It was his ambition to extend the production of metals on a geographical basis, with particular regard to those regions having mineral resources but lacking processes capable of extracting metals from them. His new conception of the selective reduction of metallic oxides made possible the production of valuable metals from minerals which had previously been unexploitable. In order to transform these ideas into reality, however, financial support on a considerable scale was required.

The Strategic Materials Corporation, of New York City, has a laboratory where experimental work on the Udy process is carried out in a 100 kW furnace on quantities amounting to some thousands of kilogrammes a day, as well as a pilot plant equipped with a 1,000 kW furnace for tests on a scale of 50 tons a day. The construction of the large-scale laboratory has cost more than $2,000,000. Dr. Murray C. Udy, son of the inventor and himself an eminent metallurgist, is director of research at both laboratories, in which he is carrying on his father's work.

The Strategic-Udy Process

The Strategic-Udy process for iron and steel uses a simple method to produce these metals from the conventional starting materials or from lean or very lean ores. The two items of equipment used are a rotating horizontal kiln and the electric melting furnace. The former is very like the rotating kiln used in cement manufacture. It has two important functions: first it dries, calcines and reheats simultaneously the mineral, the flux and the coal; secondly, the gaseous hydrocarbons of the coal pre-reduce the metallic oxides of the mineral. Normally, the gas obtained from the electric furnace and the volatile fractions of the coal are used to heat the rotating kiln. This preliminary reduction eliminates more than 50 per cent of the oxygen contained in the oxides. When it is necessary to step up the temperature of the furnace, an auxiliary fuel such as gas, mineral oil or pulverised coal is employed.

Reduction Reaction of Oxides

Free Energy at 1,600 deg. K (cal/mol)

Cu_2O	14 200
NiO	22 130
CoO	27 700
FeO	39 600
MnO	63 550
TiO_2	156 950
Cr_2O_3	170 450

The chemistry of the Strategic-Udy selective reduction is simple. It depends on the differences in free energy of the reduction reactions of the different oxides under consideration.

The selective reduction is obtained in the Strategic-Udy electric furnace, which is of an original design and is essential to the success of the operation. The Strategic-Udy furnace is heated by resistance between electrodes dipping lightly into a bed of molten slag which covers molten metal on the hearth and isolates it from the reducing agents.

Aspects of Selective Reduction

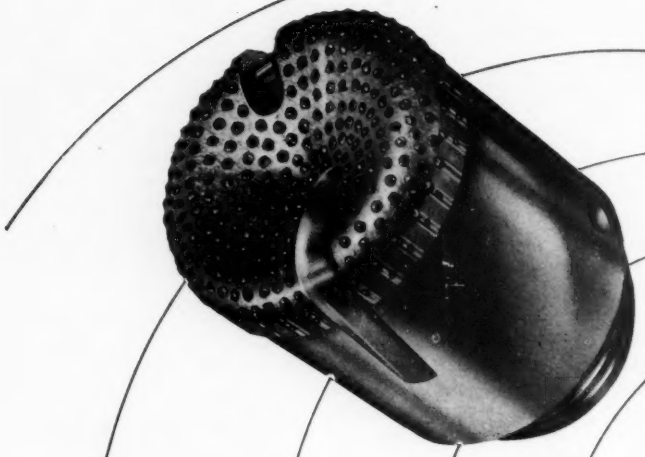
Let us consider, for example, the selective reduction of the oxides of nickel, cobalt, iron and chrome present in certain laterites. The first operation consists of introducing the mineral together with elements suitable for forming the slag, such as calcium or silicon, with a carbonaceous reducing agent, into the rotating kiln, where they are reheated and where a certain pre-reduction of the oxides of iron and nickel is produced. The reheated charge is then transferred from the rotating kiln into the electric furnace in order to complete the reduction of nickel oxide and part of the iron oxide, thus forming a ferronickel. The metal is run off; the slag residue, which contains the oxides of iron and chrome, is transferred into a second furnace. Next is added the required quantity of carbon to reduce the greater part of the iron oxide, which is run off, the chrome remaining in the slag. The second slag is transferred into a third furnace to yield a ferrochrome of 40-60 per cent. The final slag is rejected since it has no commercial value.

When the carbon is added in the first stage to reduce the oxide of nickel, it is possible that in certain zones of the bath part of the iron oxide may be reduced at the same time as the nickel oxide, but equilibrium is soon established thanks to the agitation obtained by means of a three phase current incorporated in the furnace. This agitation induces an excellent contact between the reducing agent and the oxides. The iron which would be obtained initially as a result of local excesses of the reducing agent, would be reoxidised by the nickel oxide remaining. It is naturally important that this equilibrium should be attained.

The following is an example of selective reduction: 2,000 tons of laterite containing 0.75 per cent Ni, 2.3 per cent Cr and 49 per cent Fe were treated by SUMAC at the beginning of 1958. The process was operated continuously for 75 days. The SUMAC group succeeded in producing in No. 1 furnace a very pure ferronickel, containing 10-22 per cent nickel, as called for, with 0.05 per cent C and a small quantity of Co. The slag arising from this operation was transferred in molten form into No. 2 furnace, which yielded a semi-steel of 1 per cent C, containing about 0.14 per cent Ni and 0.08 per cent Cr. The slag residue containing the Cr and a little Fe gave a ferrochrome rich in C in furnace No. 3.

The semi-steel of 1 per cent C was refined and rolled at a large American steelworks into Class C plates for naval construction and into sheets of DQ quality with low C and S contents. Refining was carried out in an electric furnace of 50 tons and the chemical and physical properties of the steels were rigorously controlled. In this way it was possible to demonstrate that products of good quality could be made from laterites which had previously been unexploitable.

The production of ferrochrome and ferromanganese by classical methods can only utilise minerals with a high Cr/Fe or Mn/Fe ratio. The Udy process permits the exploitation, for the production of ferro-alloys, of large deposits of minerals currently without value. Such deposits exist in several parts of the world.



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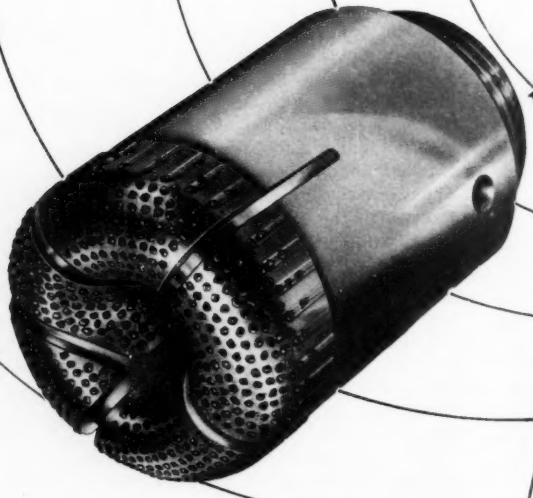

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Let us consider the case of a chrome mineral rich in iron; by selective reduction the iron oxide is first reduced and the metal is run off. The residuary slag constitutes virtually a synthetic chrome mineral having a satisfactory Cr/Fe ratio. Its treatment in a second electric furnace then permits a "standard" ferrochrome to be produced.

In the same way a manganese mineral rich in iron can be treated by first reducing the iron oxide and running it off, the slag residue then being capable of yielding a commercial ferromanganese.

In the case of titanium minerals rich in iron, the titanium remains in the slag after the molten metal or semi-steel has been run off and can be adjusted to the composition required to yield a saleable product. The titanium is then extracted in the form of its pigmentary oxide, when the operation becomes payable.

Treating Finely Disseminated Minerals

The Strategic-Udy process offers the important advantage of being able to treat very finely disseminated minerals or sands without agglomeration or preliminary pelletisation; in this it differs from the blast furnace or the electric arc furnace which cannot utilise the fines.

The Strategic-Udy process is equally practical for treating iron ores which are rejected for the conventional reduction processes because they are too low grade. It allows minerals containing more than 30 per cent Fe to be treated if the constituents of the gangue are brought into equilibrium. If the silica content of the gangue is high, 40 per cent Fe is required.

Another important advantage of the Strategic-Udy process is its valuable attribute of being able to use any type of carbonaceous fuel. Such materials as lignites and bituminous coals can be used instead of costly metallurgical coke.

At the present time three plants using the Strategic-Udy processes are under construction and eight others are projected. At the pilot plant situated at Niagara Falls, Ontario, construction of a ferrochrome production unit is making rapid progress; the electric furnace has a capacity of 10,000 kVA and the rotary is 2.40 m. in diameter and 45 m. long.

The Strategic-Udy reduction process comes at the right time to satisfy the desire of many countries to extract their own minerals, to have their own metallurgy, and to consume their own metals for their own needs. There exists throughout the world a growing tendency for each nation to render itself independent by creating its own metal industries. This is indicated by the number of engineers, metallurgists and financiers, who, in the past four years, have visited Niagara Falls to test their minerals in the Strategic-Udy installations, sometimes to the extent of an entire shipload. As a result of these activities, it is believed that the Strategic-Udy metallurgical processes will be used in many countries in the treatment of minerals up to now considered as having no commercial value.

PLANNING AN IRON ORE SHAFT IN WEST GERMANY

A new central shaft, Fortuna II, went into operation in 1960 in the Salzgitter district of Western Germany. A large part of the equipment for the Fortuna iron ore mine of the Barbara Erzbergbau A.G., was supplied by Demag, who had built the winding installation for the Fortuna I mine in 1937. The following article has been extracted from "Demag News"

THE Fortuna mines of the Barbara Erzbergbau AG are situated in the southern part of the Salzgitter mountain range between Goslar and Salzgitter. Fortuna, Ida and Morgenstern mines have a total daily output of 4,000—5,000 tons of the Salzgitter type ore containing on the average 28 per cent Fe and 28 per cent SiO_2. The ore is won from extensive deposits by the room and pillar method with irregular rooms. Concentration is completed in a central dressing plant at the Fortuna mine.

In the old layout, the Ida and Morgenstern mines were operating separately and independently. Subsequent to preliminary dressing the ore produced at these mines was taken to the central dressing plant. From the Morgenstern mine the ore was conveyed by a 3.8 km. long aerial ropeway, and from the Ida by special cars on the 5.5 km.-long mine siding. The crude ore from the Fortuna mine is conveyed from the shaft directly to the dressing plant via a conveyor bridge after preliminary crushing in the surface installation. Whereas the cage winder is designed as a drum winder, the skip winder is a Koepe hoist. No provision for preliminary crushing has been made underground. Sizing grids installed underneath the rooms limit the size of the crude ore to lumps approximately 60 cm long.

To ensure economy even with costs increasing due to a shorter working week and poorer quality crude ore at greater depth, it was proposed to establish an underground link between the Fortuna mine, the Morgenstern mine situated 4 km to the south, and the Anna/Hoffnung lease area located 2 km. to the north so as to form an integral mine. In this way all surface operations at the Morgenstern mine including shaft winding at Morgenstern and aerial ropeway operation from Morgenstern to Fortuna are dispensed with; the output of the Morgenstern surface installations was anyway limited to 400 tons/ shift and caused considerable operating cost.

The existing winding shaft at the Fortuna mine was not capable of coping with any further production from the areas to be linked up. Moreover, neither the winders nor the headgear at the Fortuna mine would have been capable of handling the production from the next lower level in the Fortuna area, quite apart from the fact that the timbering in the Fortuna shaft involves considerable maintenance, specially in those parts where the rock is brittle. In the safety pillars of this shaft there are still reserves of approximately 2,500,000 tons of ore which, formerly, were considered unworkable and which, certainly, is no small amount.

New Central Shaft

These considerations led to a new central shaft being provided, *i.e.* the No. II shaft of the Fortuna mine. Together with the crude ore coming from the Ida mine via the mine junction railway, the compound installation was to supply the dressing plant with 5,500 to 6,000 tons of ore per day. This meant that the No. II shaft had to handle an output of 4,000 tons/day. During many years to come 70

per cent of this tonnage will come from No. 3 level located at a depth of 175 m., and 30 per cent from No. 7 level located at a depth of 410 m.

The good results obtained with the single-compartment skip winder in No. I shaft led to the adoption of a similar winder for winding ore in No. II shaft. The skip winding installation of this shaft was to be designed to handle the total production. The plan dimensions of the skip were to be as large as possible in order to prevent the unbroken material to be handled from clogging. With a cubic capacity of 5 cu. m. and a pay load of 9 tons, the bottom-discharge skip was given plan dimensions of 1.5 by 2.15 m. Apart from its ability to serve several levels, a single-compartment skip winder has the considerable advantage of permitting much simpler and less costly filling facilities and making it possible for the width of the skip to be used for loading and unloading.

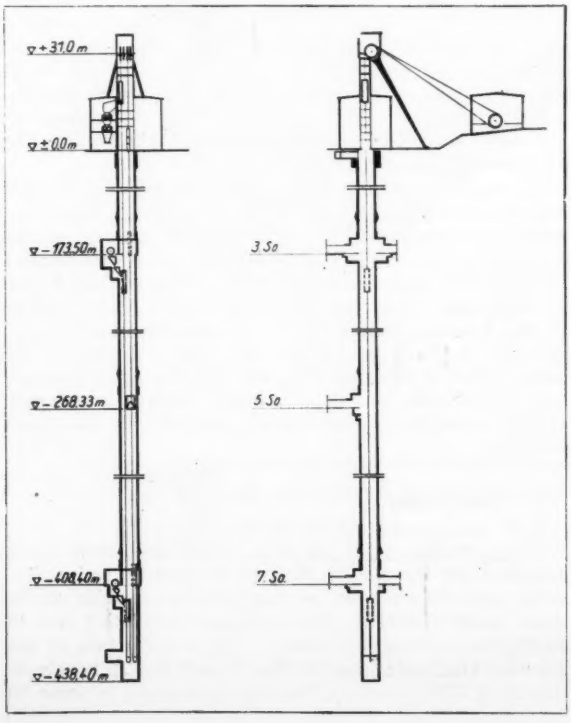
At a low speed of only 6 m./sec., this single-compartment skip winding installation is capable of raising 320 tons/ hour from the third level plus 180 tons/hour from the seventh level with a driving power of not more than 450 kW. On the basis of the production hoisted from each of the two levels, an actual winding time of roughly 15 hours is required to hoist 4,000 tons/day.

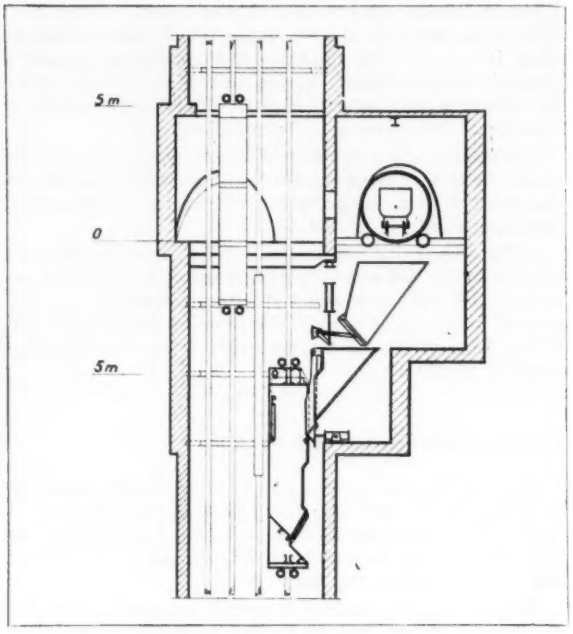
Second Winding Installation

In order to utilize the skip winding plant purely for winding ore, it is intended to incorporate a second winding installation with cage and counterweight in the same shaft. The use of a Koepe hoist was a matter of course after single-compartment winding had been decided upon. Small depths and not unusual rope loads, max. 25 tons for the skip made the adoption of single-rope winding highly advisable.

The crude ore from the Fortuna mine must be pre-crushed before it can be stored in bunkers. With skip winding from two levels, preliminary crushing underground would involve too great an expense, especially on account of the large chambers that would have been required in the not very stable rock.

Vertical section through No. 2 shaft





Skip filling installation on 3 Level

The preliminary crushing plant has, therefore, been located on the surface in the immediate vicinity of the shaft, i.e. in one section of the shaft shed. It comprises two high-speed roll crushers, arranged one on top of the other, into which the material is discharged from the skip without being screened. Hydraulically operated feelers have been provided to ensure that the crushers are never filled beyond their capacity.

The winders are of identical design to simplify spares holding. They have a 6 kV. 3-phase drill and gear reducers for transmitting the power on to the Koepe pulley having a diameter of only 4.5 m. The four fully identical headgear sheaves have also a rope tread diameter of 4.5 m.

The Filling Installation

The adoption of single-compartment winding and the absence of a preliminary crushing plant underground has resulted in a very simple filling installation. A concrete wall separates the landing for the cage from the landing for the skip. On the skip landing stage there is a rotary tippler for discharging 9-ton mine cars into a receiving hopper. The receiving hopper has a pneumatically operated flap gate. A transfer chute fitted with a freely suspended gap seal is arranged beneath the receiving hopper. As soon as the skip is in the loading position, the gap seal is moved into position and the flap gate opens, so that the material is discharged from the car into the skip. Thus the mine cars make a weighing pocket unnecessary.

All roads forming part of the filling station are single-track and have steel arches and concrete slab lining.

The slopes within the entire area of the filling station are nowhere such that the mine cars can gravitate but are still steep enough for any sludge dripping off the mine cars to flow to the sumps driven in the shelly-limestone beneath the track triangle. The mine cars are moved by means of pneumatic single-cylinder haul gears. Wherever they have

been used in mine service, haul gears of this type have proved to be sturdy and reliable in operation.

The tippler is a new design developed by Demag and is characterized by not having a kick-off and locking device. Via steel-bushed roller chains the power from two creeping-speed driving units is transmitted directly onto the tippler rings. The tippler rings have exchangeable teeth fitted at specific intervals. The chains are covered against dirt. The drive stations are pivotally mounted on tilting platforms and designed to bear resiliently on the structural supports. Resilience is obtained by means of truncated cone springs which are compressed by the inertia forces of the main motors when they start up for each tilting operation. The inertia forces are thus prevented from imparting shock loads to the driving chains. The main motors are cut out when the tippler hull has almost completed its rotation and the tippler hull is finally brought to rest by the two creeping-speed drive motors operating at a considerably slower speed. This ensures that the tippler hull is placed exactly in position for the incoming and outgoing rails without the use of a locking device. The mine cars are pneumatically pushed into the tippler against a gradient of 2 per cent. This arrangement ensures that the cars will not run through the tippler. Run-back stops prevent the cars from running back.

To speed up winding and, above all, to safe-guard it against faulty operation, the skip winding installation has been provided with an automatic system. The sequence of winding is as follows: as soon as the skip has been run into position at the filling station on the third or seventh level, the gap seal automatically closes the gap before the flap gate of the receiving hopper opens and material in the receiving hopper is discharged into the skip. Automatic operation terminates at this point. Only after the skip banksman has actuated a push-button is the flap gate of the receiving pocket closed, the gap seal returned to its original position and the starting impulse transmitted to the winder. This enables the skip banksman to check whether sticky ore lumps have accumulated in the receiving hopper or on the chutes; any lumps that may have accumulated can then be pushed off to prevent damage to the flap gates. Only after the skip has moved away, can the skip tenderer discharge another mine car load into the receiving hopper. With a time cycle of 100 seconds there is sufficient time for this operation.

After its discharge, the skip remains at the pre-crushing plant, so that the surface banksman can check whether the skip has been completely emptied—especially near the bottom flap gate—before he gives the starting impulse by means of a push-button.

PRIORITY FOR INDIA'S COPPER PROJECTS

MR. SHRIMAN NARAYAN, a member of the Planning Commission, told Pressmen recently at New Delhi, that in view of the shortage of copper in India the Planning Commission had given high priority to the Khetri and Daribo copper projects to save foreign exchange. The work on both the projects had been entrusted to the National Mineral Development Corporation, he added. The detailed project report was expected to be ready by March next year.

The Khetri project would consist of a mine, a concentrating plant and a smelter, with an annual capacity of 10,000 tons of copper. The estimated cost of the project is Rs. 100,000,000. On the basis of the data obtained from investigation, the mine is estimated to contain about 28,000,000 tons of copper ore.

In the Daribo deposits in Alwar district an area of about two square miles has already been explored and the ore has been found to be richer than in Khetri. The Daribo project will consist of a mine and a concentrating plant estimated to cost Rs. 25,000,000, with an annual output of about 1,500 tons of copper metal.

The question of constructing a railway line from Chirawa station to the Khetri project site is being considered by the Railway Board.

Sikkim Copper Project

Mining operations in the Sikkim Mining Corporation's joint Indo-Sikkimese venture to exploit the copper deposits in the Singtam area are expected to begin in January according to the Maharajkumar of Sikkim. The main buildings have been almost completed and orders have been placed with an American firm for the main milling plant. The major hindrance so far has been the lack of power which will only be rectified when the Singtam hydro-electric projct starts operating. This project is expected to generate about 2,000 kW. Though it may not be in operation before March, the mining authorities expect to receive partial power supplies by January. Milling operations, however, are not expected to begin before next spring.

A complete flotation plant is expected to be set up in the Rangpo copper mines by June next year. The Maharajkumar said that these plants would produce copper concentrates which would be smelted in Ghatsila in India.

Rich copper deposits he revealed, had been found in Dikchu, north of Gangtok and in Chakung.

A copper smelter could be installed in Sikkim only when exploitation of the Dikchu copper belt in North Sikkim begins. In the belt, said the Maharajkumar, 12 to 15 per cent of copper could be recovered from the ore. " If we can solve the mystery of the belt's origin, we have really struck it rich," he said.

Referring to the plans for exploitation of industrial resources of Sikkim by the Kamani group, the Maharajkumar said that it would initially invest about Rs. 60,000,000 in Sikkim. The company would receive technical collaboration from Swiss, Italian, and West German firms.

Supply Difficulty for India Copper Corporation

The chairman of the Indian Copper Corporation, Mr. P. W. Parish, in his statement at the recent extraordinary general meeting, held at Calcutta, has explained the difficulties facing the company in regard to supplies of essential materials. The rolling mill, he said, was receiving insufficient quantities of zinc. Ore prospecting had been slowed down due to shortage of explosives and coal stocks had completely run down, forcing the closure of the works. Although fresh coal supplies were expected, until a buffer was built up, the position would remain critical. He expressed fear that until sufficient supplies of these materials were assured production would be liable to be interrupted.

Mr. Parish also announced that the dispute between the Company and the Bihar Government regarding the lease of kyanite, had been settled by compromise. Operations for mining kyanite, most of which goes to export markets, could now go forward on a basis which is considered to be fair both to the Government of Bihar and the Corporation.

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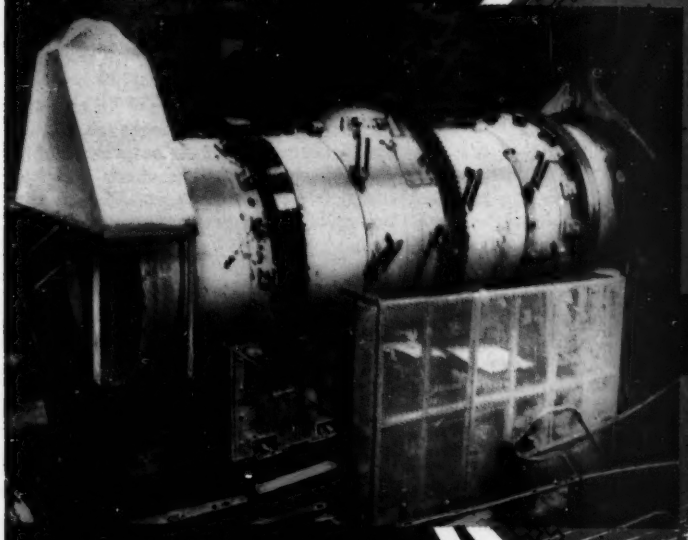

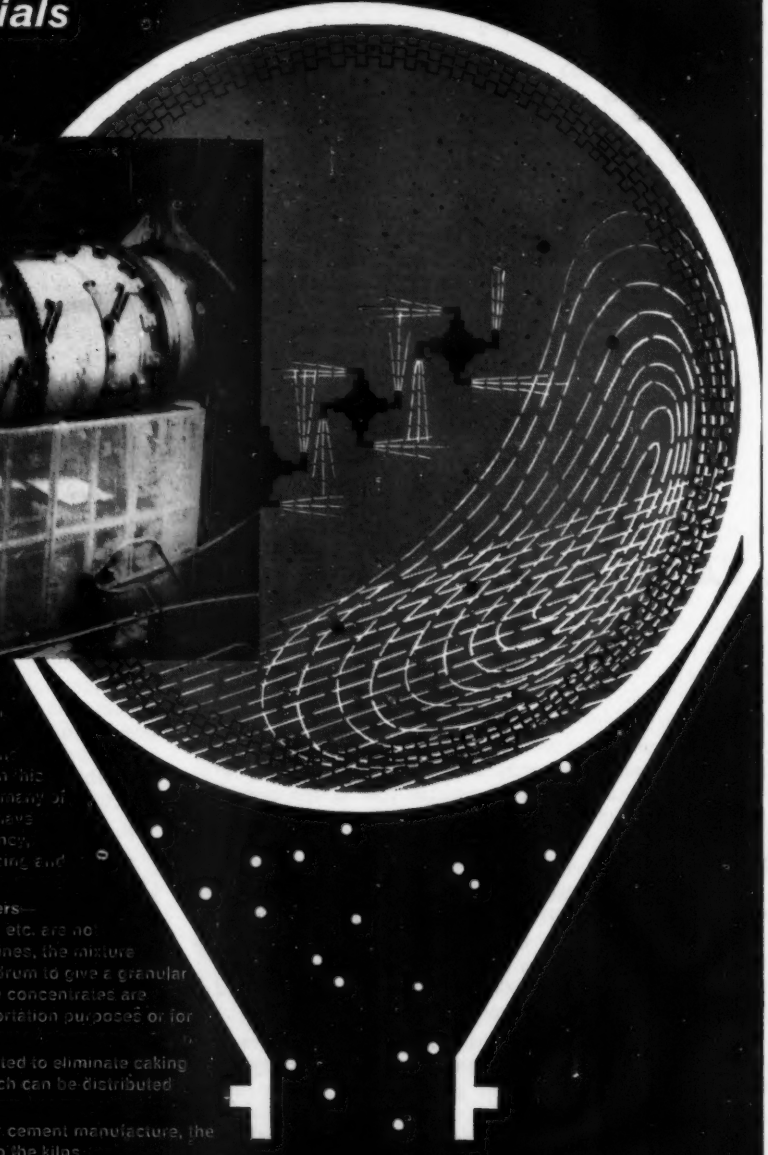

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Technical Briefs

Viscosity of T.B.E.-Diluent Mixtures

Most mineral separations using a TBE process are not carried out with the pure liquid. The TBE is usually diluted with a suitable liquid to the required density of separation. Since the viscosity of the float-sink liquid can play an important part in the efficiency of separation the viscosities of TBE mixtures have been determined for the two diluents iso-propyl alcohol (IPA) and SBP6 (Special Boiling Point No. 6 white spirit, Shell Mex & B.P. Ltd.).

The results show, that for a small addition of diluent to pure TBE, a large drop in viscosity results. For example, in the constantly recurring problem of the separation of clean quartz from an ore, a density of 2.6—2.66 is generally used and at this point the viscosity of the mixture is 6.1cp and 4.4cp for IPA and SBP6 respectively compared to 12.0cp for pure TBE.

These results, states G. D. Lill, Baker Perkins Ltd., are also of considerable interest from other aspects as, wherever —150 mesh (B.S.S.) particles have to be dealt with, free settling rates are governed by Stokes' Law and are therefore dependent on viscosity. For example in the treatment of a coarse ore by a TBE process a slimes problem will often arise as it is virtually impossible to remove all fines prior to treatment. Although the proportion of slimes will probably be small they may well contain valuable mineral which must be recovered apart from the recovery of the TBE itself. The slimes TBE separation may be a simple free or hindered settling process aided by flocculation and the correct choice of diluent for the coarse ore plant could result in greatly increased settling rates and thus reduce the size of the slimes recovery plant.

The viscosity of the TBE may well play an important part in the separation of two minerals heavier than TBE by a TBE process. Just as shale suspensions are allowed to remain in the water to improve the apparent specific gravity differential in the washing of coal and shale in a Baum jig, TBE may be used to increase the hindered settling ratio, either to improve the separation of two minerals heavier than TBE or, to make a separation possible where none existed by conventional methods. Such a process will involve agitation by some means and the motion of fluid through a bed of particles is again governed by the viscosity up to a size range of particles much coarser than those normally obeying Stokes' Law.

ALUMINIUM FLUORIDE FROM OFFGAS

Aluminium fluoride is an essential chemical in the production of metallic aluminium. The Hall-Heroult aluminium reductions cells liberate some fluorine from the cryolite bath; thus, the electrolyte becomes basic, and operation is impaired. The electrolyte is brought back into balance by the addition of aluminium fluoride. The production of 1 ton of aluminium consumes about 50 lb. of commercial-grade (greater than 82 per cent AlF_3) aluminium fluoride. In 1959 the domestic production of aluminium was 1,954,000 s.tons; this output would consume approximately 49,000 s.tons of commercial-grade aluminium fluoride.

Commercial-grade aluminium fluoride is produced by generating anhydrous HF from acid-grade (maximum silica content = 1.1 per cent) flourspar and sulphuric acid and reacting the HF with alumina or alumina hydrate. The use of fluorspar of higher silica content is discouraged because of silicon tetrafluoride formation. This restricts the fluorspars used to those which can be beneficiated to acid grade. Fluorspar reserves for the production of hydrogen fluoride would be greatly increased if aluminium fluoride of commercial grade could be produced from wet hydrogen fluoride gases generated by pyrohydrolysis of offgrade fluorspar.

Previous research has shown that a wet offgas averaging greater than 5 mole-per cent hydrogen fluoride can be generated by pyrohydrolysis of siliceous fluorspar. This posed the question of whether it would be technically feasible to produce commercial-grade aluminium fluoride from such an offgas. A thermodynamic analysis of the problem was made, using the literature for standard values and for enthalpy and entropy changes. Calculations using the value listed by the U.S. National Bureau of Standards for the heat of formation of aluminium fluoride indicated only a slight possibility of producing aluminium flouride from dilute hydrogen fluoride and alumina monohydrate. However, when the standard heat of formation for aluminium fluoride as determined by Gross and co-workers at the Fulmer Research Station, Stoke Poges, Bucks., was used in calculating the free-energy change, the reaction appeared to be thermodynamically feasible. To resolve this situation, the system was evaluated in the laboratory.

The reactions have been described in U.S. Bureau of Mines *Report of Investigations.* 5820.

A CONSTANT-FEED DIRECT-CURRENT ARC

The development of a constant-feed method for the continuous vaporization of successive increments of powdered rock and mineral samples into a 10-ampere direct-current arc is described in U.S. Geological Survey Bulletin 1084-J.

Long, deep-bore graphite electrodes having a 0.092 in. outer dia. and a 1.5 in. bore depth of 0.046 in. dia. are used as sample anodes. Concomitant vaporization and excitation of such elements as titanium, aluminium, silicon, copper, germanium, arsenic, and lead are obtained by gradually moving the electrode into the arc through a channel in a brass, water-cooled collar. The collar is placed on an electrode holder which was designed to permit controlled atmospheres to pass upward around the electrodes. A gas mixture flowing at the rate of 14 cu. ft. per hr. argon and 7 cu. ft. per hr. oxygen was selected to suppress cyanogen band interference in the spectra.

Samples mixed with graphite powder burn more evenly in the arc and show less selective volatilization than untreated samples. The addition of lithium borates to the sample and graphite generally enhances atom lines but tends to suppress ion lines. Tests of matrix influence are made in which intensity ratios of atom lines of silicon, aluminium, magnesium, and iron are compared with ion lines of iron, titanium, and calcium (in NaCl and ZrO_2 bases) for sample-graphite mixtures of 1 : 1, and sample lithium tetraborate graphite mixtures of 1 : 2 : 3.

The ranges of per cent deviation from a unity intensity ratio, which can be considered a measure of the matrix effect of NaCl and ZrO_2, are 13-32 per cent for atom lines in the graphite admixture, and 13-33 per cent for the same lines in the lithium-buffered mixture. The ion lines show 23-55 per cent and 16-27 per cent deviations, respectively. Comparative results with the same sample compositions are given for more conventional ¼ in. cupped graphite electrodes, for which an electrode holder is described. The above atom line intensity ratios for these electrodes deviate from unity by 30-65 per cent and 12-36 per cent, respectively. Comparable deviations of the ion line ratios are 159-286 per cent, and 46-139 per cent. Marked reductions in line broadening and self reversal are noted in the constant-feed direct-current arc.

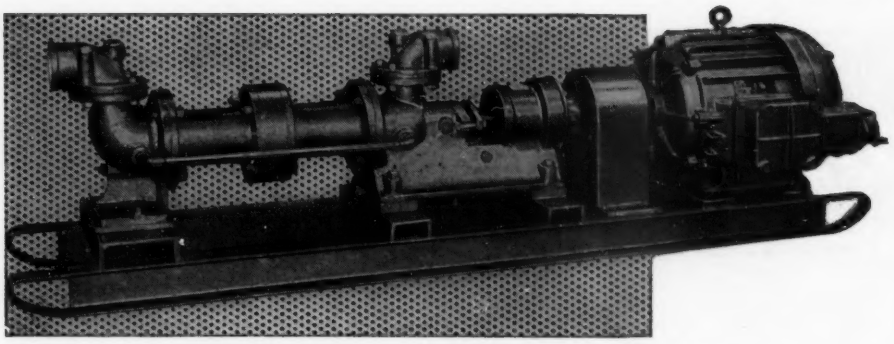
The study of a constant-feed method or introducing samples into the arc for spectrochemical analysis was the primary purpose of this investigation. Such a method is envisioned as one in which the sample is brought into the arc in many successive increments, each unit of sample undergoing the same processes in the arc independently. The attendant decrease in selective volatilization would possess several advantages (Ahrens, 1950, p. 68, 85, 115):

1. The variations in average electron energies during the course of an exposure would be diminished.
2. Fewer internal standards would be suitable for a greater number of elements to be determined.
3. A proper buffer could be added to the sample and be present at a relatively constant rate throughout the arcing period.

In the spectrochemical analysis of rocks and minerals large diversities of chemical compositions and physical forms are handled. Accurate analyses require standards similar to the samples analyzed. The work reported here is directed towards reducing the number of standards required and generalizing procedures to handle a larger variety of materials.

Methods directed towards accomplishing the above objectives and applicable to d-c arc excitation have been reported. Semenov (1956) describes the use of a "carbonized straw" of 0.9 mm. outside dia., 0.8 mm. inside dia., and 80 mm. length, which contains the sample. This "straw" is fed into the arc through a hollow, water-cooled anode by a motor-driven mechanism, the speed of which can be varied depending on the nature of the sample. A modification of this method is described by Noar (1957). A pellet is made from a mixture of sample, Li_2CO_3, and cellulose powder. This pellet is fed into the arc by a motor-driven push rod, through a hollow carbon anode. Heat is conducted away from the electrodes by brass finned collars.

A method for introducing powdered ore samples between two carbon electrodes inclined 45 deg. from the horizontal is described by Toishi (1940). Another method for introducing powdered samples directly into an a-c arc is described by Rusanov and Khitrov (1958). The work of Danielsson and Sundkvist (1959) illustrates the excellent precision obtainable when dissolution of sample is combined with constant-feed.



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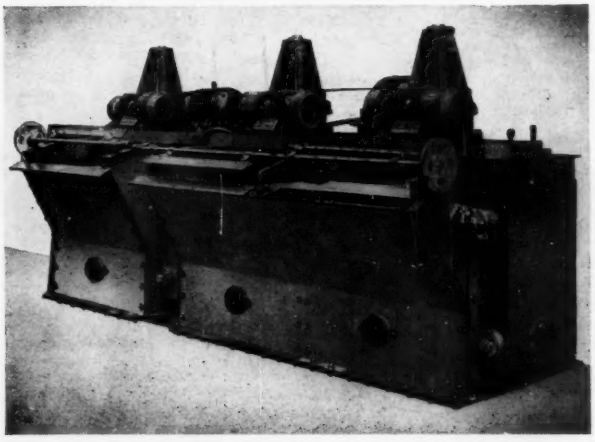

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MINING MISCELLANY

Italian Mining Companies Merger.—A merger is reported to be planned in Italy of the mining companies Montevecchio Societa Italiana del Piomo e dello Zinco of Milan, and Societa di Monteponi S.p.A., of Turin. The former company, which will be merged into Monteponi, has a capital of 4,000,000,000 lire, 50 per cent of which belongs to the Montecatini company, while Monteponi has a capital totalling 3,600,000,000 lire. Monteponi, which paid no dividend for last year, mines Sardinian reserves, and Montevecchio operates both in Sardinia and on the Italian mainland.

New Mine at Noranda ?—Intense interest has once again been aroused in the famous old Noranda camp in Northwestern Quebec, reports *The Northern Miner*, by the important findings of Lake Dufault Mines. The discovery hole at Dufault gave a core section of 153.5 ft. averaging 4.0 per cent copper and 12.2 per cent zinc, followed by a second intersection of 70 ft. averaging 2.41 per cent copper and 0.74 per cent zinc. The second hole, 100 ft. east of the discovery, has shown 158 ft. averaging 4.0 per cent copper and 8.4 per cent zinc, followed by 168 ft. averaging 2.74 per cent copper and adjoined by another 112 ft. averaging 0.96 per cent copper.

Mexican Iron and Steel.—The Mexican iron and steel industry expects that 1961 will show peak production; ingot output had reached 825,900 tonnes in the first six months, compared with 1,500,000 tonnes for the whole of 1960. Expansion projects should bring 1965 output to some 3,900,000 ingot tonnes, making Mexico nearly self-sufficient

Sierra Leone Iron Deposits.—The Sierra Leone Development Co. are not proceeding with the development of the Tonkolili iron ore deposits, after the W. German steel manufacturers' decision against investment in the scheme. The company is, however, continuing expansion at their Marampa mines, where a total of £7,000,000 is to be invested in further expansion of the milling capacity, and in port improvements at Pepel.

Thai Iron Exports.—The first shipment of iron ore to the Fuji Steel Corporation of Japan from the small island of Koh Samui, off the east coast of South Thailand is to be made shortly. The deposits, estimated at 300,000 tons, are expected to be exhausted within three years. Extraction began in 1961. The company working the deposits is Lohapas Phanit Co. The concession is held by the Burapha concern.

Russia Aids Bhilai Steel.—The Government of India has approved a Russian project report for expansion of capacity at the Bhilai steelworks from the present 1,000,000 tons a year to 2,500,000 tons. The estimated cost is $32,000,000, including $12,600,000 in foreign exchange which has already been provided by the Russians.

Bauxite Mining in Sierra Leone.—The government has granted rights to prospect and mine bauxite in parts of the Banda and Dasse Chiefdoms to the Sierra Leone Ore and Metal Co., a subsidiary Aluminium-Industrie AG. of Zurich. The agreement stands for 15 years, and mining is to start next year in the Kokanji Hills.

Indonesian Mining.—The Indonesian State oil company, Pertamin, is to launch an extensive programme of geological exploitation and research. Indonesia and Japan are to set up a joint enterprise to produce iron and other metals from Indonesian laterite ore. Prospecting of the Dieng Plateau, near Semarange, in Central Java, has resulted in the reported discovery of approximately 150,000 tons of sulphur deposits. The Gombong district in the Regency of Kebumen, is reported to contain over 100,000 tons of manganese and 48,000,000 tons of phosphate stones.

New Indian Sinter Plant.—Hindustan Steel Ltd. has asked Koppers Export G.m.b.H. of Essen, West Germany, to build a plant for the production of sinter materials from iron ore at Rourkela. The German company will build the plant in co-operation with Kopper Co. Inc. of Pittsburgh, U.S. The plant, which will cost some Rs. 40,000,000 will have a daily sinter metal output of some 4 tonnes.

Manganese Plant for Bulgaria.—A production unit for the output of 6,000 tonnes of manganese concentrate annually is to be added to the Stalin chemical combine at Dimitrovgrad. The concentrate, to be manufactured from indigenous ores, will be used for the production of ferro-manganese, according to a Bulgarian government bulletin. Production of silicon dioxide is also planned in Bulgaria.

Pittsburgh Steel's Canadian Investment.—Pittsburgh Steel Co. plans to invest $2,800,000 in a combine which Wabush Iron Co. is developing in its iron ore property in Newfoundland. Contracts totalling $3,770,000 for engineering and production facilities, include a contract for annealing furnaces, and other equipment which went to General Electric Co.

Mining Board for Rajasthan.—The Rajasthan government is considering setting up a mining board to operate two major state-owned projects for prospecting fluorspar and lignite. The Third Plan makes a provision of Rs. 2.75 crores towards these projects, which will ultimately cost Rs. 5 crores, according to a report in the *Eastern Metals Review*. At present India is importing 10,000 tons of fluorspar, at a cost of Rs. 3 crores. With the production of aluminium and steel rising demand is expected to increase to 30,000 tons annually. Of this, Rajasthan could meet 70 per cent of its requirements. The lignite project, work on which will start by the end of 1963, will produce five lakh tons of lignite from reserves, estimated at 21,000,000, near Bikaner. In addition to meeting demands of the neighbouring States, the lignite will be used at the rate of 1,500 tons per day for working a 50,000 kW. thermal station, and brick and lime kilns around Bikaner.

Australian Iron Ore Reserves.—Ore reserves of North Broken Hill are reported as 4,200,000 tons of proved ore and about 6,000,000 tons of probable ore, indicated by diamond drilling, with the lode continuing strongly beyond the limits of the estimated reserves. A co-operative exploration agreement has been entered into by North Broken Hill, Electrolytic Zinc Co. and Broken Hill South to carry out exploratory work, mainly geophysical, in the Broken Hill region.

Russian Purchase of Chilean Copper.—A Soviet delegation has been in Santiago to sign a contract for the purchase of 300,000 tonnes of Chilean copper. The contract will cover a period of five years, and will involve the sale of 35,000 tonnes of copper bars and 25,000 tonnes of electrolytic wire annually.

New Indian Minerals Corporation.—The Maharashtra Minerals Corporation has been registered, with headquarters in Bombay and an authorized capital of Rs. 50 lakhs, to mine and produce ores in Maharashtra State. Mr. Vartak, recently elected chairman of the corporation, said that State financial participation was 26 per cent. Initially activities would be confined to the Konkan region. Projects being considered include the beneficiation of ilmenite sands on the Ratnagiri coast, manufacture of sintered bauxite, alum cake and alums from bauxite in the Kolaba district, and survey of the possibility of beneficiation of chromite occurring near Kankaoli in the Ratnagiri district. India exports large quantities of ilmenite annually to Europe and the U.S.

Tax on Chilean Molybdenum ?—The Chilean Congress is considering a new tax on the production of American copper companies operating in Chile. This is based on legislative proposals for a 50 per cent tax on exports of molybdenite and pure molybdenum which would be calculated on the basis of "average yearly value" of quotations of molybdenum ores on the New York and London markets.

Austrian Iron Ore Output.—Austrian iron ore output in the first eight months of 1961 amounted to 2,231,400 tons compared with 2,455,500 tons in the same period of last year.

New Iron Ore Deposits in Urals.—It is reported from Moscow that two new large deposits of magnetic iron have been located in the Urals; one at Severopeschansk, with an estimated reserve of 100,000,000 tons, is to be opened at once, and is expected to yield about 2,000,000 tons of ore annually. The second, at Novopeschansk has an estimated reserve of 60,000,000 tons. These two deposits are expected eventually to produce between 250,000,000 and 300,000,000 tons of ore.

Japanese Chrome Purchases.—It is reported from Tokyo that Nippon Steel Tube Corporation is negotiating with Philipp Bros. of the U.S. for the export to Japan of about 6,000 tons of low-carbon ferro-chrome in exchange for chrome ore imports. The amount contracted would be delivered by March 1962, and was expected to consist of Turkish chrome ore. For the first shipment of 3,200 tons the Japanese manufacturers' would accept 6,000 tons of ore, but it was not known yet how much ore would be imported in exchange for the exports of the remaining 2,800 tons to the U.S. The Japan Ferro-Alloy Producers' Association said that output of chromium products totalled 10,539 tons in October 1961.

Angolan Iron Ore.—It is reported from Lisbon that over the first six months of 1961 some 246,000 tonnes of iron ore, valued at 70,000,000 escudos, were shipped from the Angolan port of Luanda. West Germany was the principal customer, buying ores valued at 42,000,000 escudos.

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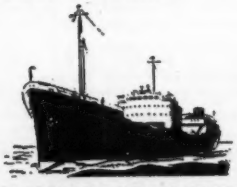

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Metals and Minerals

Columbium Additive Steels

As far back as 1958, columbium treated carbon steels were being widely tested in the U.S. and the U.K., the chief advantages claimed being higher strength with economies to the steelmakers. In the event of these tests proving successful, an important market for ferro-columbium was foreseen, more especially since the major benfits in yield strength were found to occur at a very low level of columbium content, thereby allowing important improvements to be made at comparatively low cost.

It was reported recently in the U.S. that a patent covering the use of a steel refining formula based on the addition of small amounts of columbium to the melt had been granted to the National Steel Corporation. The company describes the patent as covering a columbium-additive grain-size refining formula that puts into semi-milled mild carbon steel up to 50 per cent greater yield strength and preserves essential "working properties" at the higher strength levels for end-product application. The patent is also defined as covering the process for producing the steel which gets up to 20 per cent higher ingot yields than are obtainable from the production of "fully killed" carbon steel with comparable strength, in which connection it is pointed out that semi-killed is also less costly to produce than killed steel. The company further claims that the patent covers all mill-level products producible from the invention.

According to National, the addition of about 8 oz. of columbium to a ton of steel permits an increase of 150-200 deg. F. above the temperature at which ordinary mild carbon steel will suffer undesirable grain growth. The columbium does not "deoxidize" the steel. It is National's contention that, while high-carbon-manganese steels offer strength equal to columbium-additive steel, their general development over the past three decades has never overcome the unfavourable effects of carbon and manganese or working properties while imparting strength to steel.

Market development during the period covered by the patent application, has placed columbium-additive steel into production use for motor cars, trucks, trailers, tractors, construction equipment, pressure vessels, propane cylinders, petroleum product pipelines, and loading devices for railway trucks. For these production uses, it is stated, columbium-additive steel replaced (1) conventional mild carbon steels, which offer good working properties but must be specified in heavier thicknesses, to achieve equal design strength in manufacturing end products; (2) so-called "high chemistry" semi-killed steels which offer up to 60,000 p.s.i. yield strength but are brittle and difficult to weld; and (3) some grades of killed steels, offering comparable strength and working properties but costing up to $20 a ton more than columbium-additive semi-killed steel. Columbium-additive steels are now being tested for other potential uses and plans are being studied for national-wide and eventually world-wide distribution.

The National Steel Corporation is by no means the sole U.S. producer of columbium-additive steels, which are being made and sold by several other steel companies, notably U.S. Steel Corp., and Jones and Laughlin. The big question, as *American Metal Market* points out, is whether National Steel's patent covers the production of such steels by other producers. So far the latter have made no comment, pending a study of National's patent claims.

If the potentialities of columbium steels are fully realized, the impact on the markets for mineral producers would obviously be very great. An essential requirement for the development of tonage uses is, of course, confidence in the future availability of raw materials. From this aspect, the development of commercial production from pyrochlore, though unfortunately timed from a marketing standpoint, may in the long run prove a bull point for columbite producers in Nigeria, by encouraging vigorous development of the promising fields now unfolding for columbium metal.

LONDON METAL AND ORE PRICES, DECEMBER 14, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £230 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 6d. lb.
Cerium (99%) net, £18 0s. lb. delivered U. K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt. 12s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 250s. 2¼d.
Iridium. £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram
Magnesium, 2s. 2¼d./2s. 3d. lb.
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £660 per ton
Osmium, £17/£22 oz nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £27 7s. 6d./£27 17s. 6d.
Quicksilver, £59 ex-warehouse
Rhodium, £43/£45 oz.
Ruthenium, £14/£16 oz. nom.
Selenium. 41s. 0d. per lb.
Silver, 87d. f. oz. spot and 87¾d. f'd.
Tellurium, 37s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis			28s. 0d./30s. 0d. per unit c.i.f.
Beryl (min. 10 per cent BeO)			270s./275s. per l. ton unit BeO
Bismuth			30% 5s. 0d. lb. c.i.f.
			20% 3s. 3d. lb. c.i.f.
Chrome Ore—			
Rhodesian Metallurgical (semifriable 48%)	(Ratio 3 : 1)		£15 5s. 0d. per ton c.i.f.
" Hard Lumpy 45%	(Ratio 3 : 1)		£15 10s. 0d. per ton c.i.f.
" Refractory 40%			£11 0s. 0d. per ton c.i.f.
" Smalls 44%	(Ratio 3 : 1)		£13 5s. 0d. per ton c.i.f.
Pakistan 48%	(Ratio 3 : 1)		£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10:1)	$Nb_2O_5 : Ta_2O_5$		150s./160s. 0d. per l. ton c.i.f. nom.
Lithium Ore—			
Petalite min. 3½% Li_2O			50s. 0d./55s. 0d. per unit f.o.b Beira
Lepidolite min. 3½% Li_2O			76s. 0d./80s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O			75s. 0d./85s. 0d. per ton f.o.b. Beira
Magnesite, ground calcined			£28 0s./£30 0s. d/d
Magnesite Raw (ground)			£21 0s./£23 0s. d/d
Manganese Ore Indian—			
Europe (46%-48%) basis 60s. 0d freight			73d./75d. c.i.f. nom.
Manganese Ore (43%-45%)			69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)			nom.
Molybdenite (85%) basis			10s. 0d. per lb. (f.o.b.)
Titanium Ore—			
Rutile Australian 95/97% TiO_2 (prompt delivery)			£31 per ton c.i.f.
Ilmenite Malayan 50/52% TiO_2			£11 10s per ton c.i.f.
Ilmenite Travancore 58/60% TiO_2			£15/£15 10s. per ton c.i.f.
Wolfram and Scheelite (65%)			89s. 0d./92s. 0d. per unit c.i.f.
Vanadium—			
Fused oxide 95% V_2O_5			7s. 6d./8s. per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 66-67% ZrO_2			£16/£16 10s. ton c.i.f.

RESTRICTIONS LIFTED ON FRENCH METAL PRICES

Prices of copper, aluminium and zinc semis as well as their alloys can in future be established freely between buyers and sellers according to an announcement by the French Official Price Gazette. Hitherto prices of these semis were automatically revised in proportion to rises or falls in the quotations of the French prices of copper, aluminium and zinc.

GERMAN IRON ORE MINES TO CLOSE

The closure of two German iron ore mines, employing about 900 workers, and the cutting back of production in other mines is expected shortly.

It is thought that more closures may follow as for years iron ore mining in Germany has been struggling against the competition of higher-grade ores imported from Sweden and other sources overseas.

Germany is the world's largest importer of iron ore, next to the United States which has a crude steel production about three times as high. In 1960 Germany took 24 per cent of the world's iron ore imports, compared with 31 per cent bought by the United States and 18 per cent bought by the United Kingdom.

SILVER MAKES FURTHER GAINS

In response to a good demand for both speculative and consumer purposes, the price of silver has again appreciated quite sharply, rising on Monday to 86½d. spot and 87¼d. forward. It now stands at 87d. spot and 87¾d. forward delivery. In New York the price of silver is currently quoted at 102¾c.

FERRO-MANGANESE IN INDIA

A committee is to be set up by the Indian Government to study various problems relating to the ferro-manganese industry. It will consider ways and means of ensuring the regular supply of raw materials and will also study such matters as railway freights, manufacturing processes, and the use of by-products. The chairman will be Mr. N. M. Wanchoo, Ministry of Steel, Mines and Fuel.

I.C.I. CUTS TITANIUM PRICES

Reductions to 10 to 15 per cent, according to form and alloy, in the basic prices of wrought titanium have been announced by the Metals Division of Imperial Chemical Industries Ltd. This is their sixth substantial price reduction since they first began selling wrought titanium, in 1954, and the new prices take effect from January 1, 1962.

The policy of titanium producers, both in the U.K. and in the U.S. has been to bring down prices as fast as possible to speed recovery from the depression in 1958.

The price of hot rolled plate, 1 in. thick, will be 43s. against 49s., commercially pure sheet, 8 ft. by 2 ft. by 20 gauge, will be 60s. against 73s., alloy sheet, 6 ft. by 3 ft. by 20 gauge will be 125s.-142s. against 135s.-145s., commercially pure strip in coils, 9 in. by 28 gauge, will be 77s. against 86s., forged billet, 8 in. diameter, will be 42s. against 48s., rolled rod, 1 in. diameter, will be 47s. against 56s., and extrusions will be 82s. against 90s.

"GOOD DELIVERY" GOLD BARS

Johnson Matthey announce that on December 1, 1961 the London gold market added the name Metalli Preziosi S.p.A. of Milan to the list of acceptable melters and assayers. The gold market stated that bars produced by this company and bearing its stamp will in future be accepted as "good delivery" in London. "Good delivery" gold bars can now be supplied by four companies of the Johnson Matthey Group in Europe and the Commonwealth: Johnson, Matthey & Co., Limited, London; Johnson Matthey & Mallory Limited, Canada; Garrett, Davidson & Matthey Pty. Limited, Australia; Metalli Preziosi S.p.A., Milan.

ITALIAN QUICKSILVER TAX MAY GO

The Italian Government is considering the abolition of the manufacturing tax (at present suspended), on quicksilver but it would mean a loss of 300,000,000 lire per year to the Treasury. The Italian quicksilver industry, however, needs new funds for expansion despite the recovery during 1960.

Monte Amiata increased production by 37 per cent in 1960 while sales during 1960 increased by 38 per cent compared with 1959, mainly because the suspension of the manufacturing tax allowed the company to remain competitive in world markets.

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Italian quicksilver exports during the first nine months of this year totalled 863,200 tonnes, compared with 1,298,200 tonnes (revised) in the corresponding 1960 period, according to the Central Statistical Institute.

COLUMBITE G.S.A. SALE

The G.S.A. have invited sealed bids for 18,700 long tons of surplus tin slags containing columbium and tantalum pentoxides. Bids must cover the total tonnage at both depots—approximately 4,174 tons are stored at Niagara Falls, N.Y., and 14,732 tons at Welland, Ontario.

The materials will be sold on an "as is where is" basis.

HIGH PURITY TELLURIUM

Canadian Copper Refiners Ltd. a subsidiary of Noranda Mines Ltd., is planning to start commercial production of high purity tellurium early in the coming year. Marketing will be handled by Noranda Sales Corp. Ltd., whose potential customers are electronics manufacturers in Canada, the U.S., and Europe. If the company is successful in marketing high-purity titanium, consideration will be given to commercial production of bismuth-telluride, tellurium of semiconductor grade, and other tellurium products.

U.K. WOLFRAM ORE MARKET

Demand for wolfram ore has been better than of late and the price currently appears less insecure at 89s. to 92s. per long ton unit c.i.f. Europe. Buying, trade quarters said, has been spread fairly evenly between the U.K. and the Continent. At current low levels sellers in some instances are less willing to operate and this coup'ed with the better demand and the fact that the ferro-tungsten price has not been reduced are sustaining influences.

ALUMINIUM "NO TOLL ALLOWANCE" RESTORED

The Kaiser Aluminium and Chemical Company has announced that it was restoring the "no toll allowance" of one cent a lb. on extrusion ingot which was cancelled earlier this year when major aluminium producers reduced prices.

In effect this means that alloy buyers will be able to obtain their aluminium for one cent less per lb. if Kaiser are not obliged to buy back the buyers scrap or excess metal. A Kaiser spokesman said that as a result of the allowance coupled with some minor price adjustment, extruders could now buy ingot for 24.3 cents per lb., against the previous 25½ cents level.

MEXICAN SILVER MINES

The Government should create incentives to encourage the operation of abandoned Mexican silver mines now that the U.S. has suspended silver sales on the open market, states Sr. Jose Campillo, president of the Mexican Mining Chamber.

The operation of these mines, he said, could mean a big boost to the national economy since Mexico is the chief producer of silver in the world, he added. Last year, he said, Mexico produced 44,000,000 oz. of silver, or 25 per cent of world production.

Sr. Campillo pointed out that around 70 per cent of Mexico's silver production comes from mines that are already producing lead and zinc. The remaining 30 per cent comes from silver mines in Real del Monte, Pachuca, Guanajuato, Guerrero, Durango and Caxaca. The rise in the price of silver, he said, would partly compensate for the drop in the international price of lead. Meanwhile, Banco de Mexico sources have said that operations in silver would continue normally with the price of the metal determined by quotations on the international market.

AUSTRALIAN RUTILE

The Australian rutile shipment price continues to make headway. For minimum 95 per cent material dealers ideas now range from £30 to £31 per long ton c.i.f. Europe compared with £28 10s. to £30 40s. previously.

Since the recovery started a few months ago the price has risen by approximately £10. Quite a useful amount of business has been done recently largely by merchants holding stocks, as producers have virtually been out of the market for some time. The U.K., Continent and Japan have shown interest, trade quarters remarked. Demand from the U.S. has so far been meagre, probably because stocks in that country are believed to be still quite substantial.

MALAYA CALLS FOR STOCKPILE RESTRAINT

The Malayan Chinese Chamber of Commerce has urged Britain and the U.S. to exercise restraint on the sale of stockpiled rubber and tin. Senator Chan Kwong Hon, addressing the annual conference said that any big sales would have "very serious repercussions" on the Malayan economy. The conference adopted a resolution recommending that the new floor price of tin be set at £800 and the ceiling price at £1,000 per ton.

Copper · Tin · Lead · Zinc

(From Our London Metal Exchange Correspondent)

Stocks in L.M.E. official warehouses at the beginning of the week were lower in the case of all four metals.

HIGHER COPPER PRICES FORECAST IN U.S.

Copper stocks in L.M.E. official warehouses fell by 201 tons to a total of 15,649 tons. On the L.M.E. prices rose by about £3 10s. 0d. on reports of interference in production due to fighting between United Nations and Katanga forces, but about £2 of the gain was later lost when a United Nations spokesman denied that their forces had destroyed industrial installations. Since then the Union Minière in Brussels has offered to produce proof of damage done in the form of documents and photographs, but it is difficult in view of all the conflicting reports to say what is truth and what propaganda. There seems no doubt that, if production ceased in Katanga, other countries could step up production by withdrawing their own voluntarily imposed restrictions.

The contango on copper remains steady at about 5s.-10s. Reports from America refer to excellent levels of copper consumption despite a drop in business in October. Based on figures for the first 10 months of this year it is said that 1961 looks like being a record year for consumption of the metal. It is true that for the time being at any rate, U.S. consumers appear to be delaying purchases for tax and inventory purposes, but no doubt they will start buying again in the new year. Certainly American sources think that generally better conditions in that country, plus possible strikes, could well lead to higher prices in the coming months.

Labour troubles in the copper industry are always a possibility, and in Chile's Chuquicamata mine in particular, which produces about 25,000 tons a month, a strike at the beginning of January is considered in some quarters to be more than likely.

Advance statistics issued by the British Bureau of Non-Ferrous Metal statistics give U.K. stocks of copper at the end of October as 145,372, tons, compared with 147,948 tons at the end of September. Copper sales by ENAMI for the account of small Chilean producers during the past week totalled 939 tons.

NO RUSSIAN TIN EXPECTED IN 1962

Tin stocks in L.M.E. official warehouses fell by 70 tons to a total of 4,182 tons. On the L.M.E. prices rose during the week by about £3 but the rise was subsequently lost. The contango on this metal is now £10 - £12.

Apart from Katanga there has been little during the week to influence prices one way or the other, and the market awaits the result of the next American sale of Longhorn. Washington has announced that a further 700 l. tons of grade A will be offered by the G.S.A. on January 3, and when this is sold they will have left only 21 tons of this grade. Some quarters report difficulty in getting supplies of Chinese tin, from whence most of the production now seems to be going to the U.S.S.R. This, taken in conjunction with the intended Indonesian shipments, indicates clearly that, as in the current year, Russian tin is unlikely to come to this country in 1962.

The I.T.C. have issued figures showing that estimated world mine production of tin in concentrates in August totalled 13,400 tons as against 14,100 tons in July; for the same months estimated world smelter production was 13,100 tons and 13,500 tons respectively. World consumption of primary tin metal is estimated as 13,700 tons in August, compared with 13,900 tons in July. Published figures show that stocks of tin concentrates in Malaya, Singapore and at smelters in the U.K. and Belgium have fallen sharply since the beginning of the year, whilst most other reported stocks of concentrates show little change. Stocks of tin metal, too, have fallen sharply since the beginning of the year.

The British Bureau of Non-Ferrous Metal Statistics reports U.K. consumption of tin in October as 1,830 tons, which is

only slightly lower than the September figure. Consumption for the first 10 months of this year is reported as 17,832 tons, which is 6 per cent less than the comparable 1960 figure. In Kuala Lumpur the Malayan Chinese Chamber of Commerce has recommended that floor and ceiling prices for tin should be set at £800 and £1000 per ton respectively.

On Thursday the Eastern price was equivalent to £964 per ton c.i.f. Europe.

LEAD-ZINC STOCKS DECLINE

Lead stocks in L.M.E. official warehouses fell by 165 tons to a total of 10,829 tons. On the L.M.E. prices have eased slightly with the contango steady at about 22s. 6d. Consumer demand for this metal appears satisfactory in the U.K. and on the Continent with specific brands not always easy to come by.

Advance statistics issued by the British Bureau of Non-Ferrous Metal Statistics give U.K. stocks of lead at the end of October as 63,920 tons compared with 65,391 tons at the end of September. In Washington the Bureau of Mines reports U.S. production of recoverable lead in October as 20,400, which compares with 19,900 tons in September and 18,339 tons in October, 1960; the January/October 1961 total was 6 per cent above the same period of 1960.

Zinc stocks in L.M.E. official warehouses fell by 195 tons to a total of 11,016 tons. On the L.M.E. prices during the week have risen by about 15s. which is attributed more to the better tone in copper than to any general increase in demand. U.K. consumers are said to be rather out of the market, whilst there is a little more interest on the Continent. The contango keeps steady at about 22s. 6d.

Refined zinc output in O.E.C.D. countries in October was 76,673 tonnes compared with 77,684 tonnes in September. O.E.C.D. producers stock at the end of October was 66,982 tonnes compared with 75,090 tonnes at the end of September.

From Rio de Janeiro it is announced that Brazil's first zinc factory will go into production in 1962. Initial yearly production will be about 7,200 tonnes of ingots, which will take care of about 20 per cent of Brazil's requirements, all of which at present have to be imported.

OFFICIAL TURNOVERS

Official turnovers (in l. tons) for the week ending December 1, 1961, with the previous week's figures in parentheses, are:—

Copper	15,475	(13,425)
Tin	2,100	(1,960)
Lead	7,150	(8,550)
Zinc	8,825	(12,925)

Closing prices are:

	December 7 *Buyers*	*Sellers*	December 14 *Buyers*	*Sellers*
COPPER				
Cash	£229¾	£230	£231¼	£231½
Three months ..	£230	£230¼	£231½	£231¾
Settlement ..	£230		£231¼	
LEAD				
Current ½ month	£60¾	£60½	£60½	£60¾
Three months ..	£61⅛	£61¼	£61½	£61⅝
TIN				
Cash	£952	£953	£950½	£952
Three months ..	£962	£963	£960½	£961
Settlement ..	£953		£952	
ZINC				
Current ½ month	£70⅛	£70¾	£71¼	£71½
Three months ..	£71¼	£71⅝	£72¼	£72½

Mining Finance

Tanganyika Concessions and the Congo

In his annual review of the operations of Tanganyika Concessions the chairman, Capt. Charles Waterhouse, has said that " it would be idle to attempt any prophecy on future events ". This is certainly understandable particularly in view of the rapidly changing situation.

Reviewing the past year, the Tanks' accounts show a satisfactory result despite the very many difficulties that have been present in both the Congo and Angola where the company's two major assets operate. In fact, the operations of the Union Minière in the Congo and the Benguela Railway in Angola had continued without interruption.

During the year ended December 30, 1960, which is reflected in the current Tanks' accounts, Union Minière produced a record copper tonnage of 230,217 tonnes, the net profit for the year was £16,898,000. The dividend paid by Union Minière for 1960 was Frs. 1500 per part sociale compared with Frs. 2,200 for the previous year, when a large sum was written back from reserves.

As a result of the transport difficulties in the Congo and particularly on the railway-river link through Port Franqui there has been a material increase in the copper and other mineral traffic on the Benguela route. The railway's net operating revenue improved in 1960 from Escudos 158,402,017 to Escudos 246,114,639. This was a very satisfactory result and the company has been able to redeem in advance debentures to the value of £809,800. The dividend rate was maintained at 12½ per cent.

In normal circumstances it is possible to assess the current year for Tanganyika Concessions at this time for both Union Minière and the Benguela Railway have almost completed their operating years. This year, however, it is hardly possible. Union Minière have a very similar copper production to that for 1960 and due to the railway link through Lobito sales have not been interrupted, however, it must be recognised that operating costs levels have probably been considerably higher. Quite apart from the difficulties of stores supply, etc., the effect of the increased labour charges introduced in 1960 will be felt in full this year.

As regards the Benguela Railway, the net operating receipts for the first nine months of the year are Escudos 208,484,937 compared with Escudos 213,878,035 for the same period of the previous year.

These results, whilst basically encouraging, can be no guide to the likely revenue of Tanganyika Concessions which is mainly dependent on dividend payments, and these payments by the operating companies will be dictated by the future as much as the past.

The latest reports from the Congo are that the Union Minière plant is practically idle and that the transformer station for the new copper-cobalt electrolytic plant at Luilu has been bombed. There is also the report of a threat from a band of exiled Frenchmen to demolish all of the Union Minière installations in Katanga as part of a scorched earth policy.

As a result of the interruption of production, Union Minière has temporarily suspended its copper quotations on the Continent and this decision has had a further effect on the stock market. Tanganyika

London Market Highlights

After the previous week's indecisive trend, South African gold shares opened with a burst of strength on Monday. No important new market factor had developed over the weekend which could have accounted for the sudden change of heart, but there had been a favourable press and this was sufficient to bring in a few buying orders which made a disproportionate impact in a sensitive market which is still very short of scrip.

Consequently, prices of all the leading issues were quickly marked-up. Among the mines themselves, Vaal Reefs led the way with a jump of 1s. 10½d. to 45s. on anticipations—later confirmed—that an increased dividend was in the offing. Free State Geduld rose 1s. 10½d. to 101s. 3d., St. Helena put on 1s. 6d. to 72s. 6d. and "Ofsits" reflected the trend of the O.F.S. group as a whole with a jump of 1s. 9d. to 72s. This increment tended to spread into shares of the older mines, but the specially acute shortage of stock here made trading very difficult. In contrast business was brisk in the finance group where Union Corporation jumped 2s. 6d. to 63s. and the ever-popular Gold Fields put on 1s. 9d. to 70s. 6d.

This sudden burst of activity had petered out on Tuesday morning when dealings and prices began to ease back. This continued for a while on Wednesday although dealings recovered later in the day. This restored St. Helena to 71s. 9d. from an initial setback to 70s. 7½d., " Ofsits " to 72s. 6d. from 71s. and Gold Fields to 70s. 3d. from 68s. 3d.

Rhodesian copper shares held up remarkably well despite the latest upheaval in the neighbouring Katanga. Chartered eased 9d. to 57s. 3d. after 56s. 9d., but if anything shares of the mines were inclined to harden a few pence. A perplexing feature of the market, however, was the steady improvement in the Katanga issues. Union Minière rallied from £8 to £8⅛ and Tanganyika Concessions showed a rise on the three days of 1s. 1½d. to 16s. 9d.; the London market could offer no explanation for the share price rises other than to point to a demand from Brussels which could have reflected bear-closing there.

Equally illogical were the severe see-saw movements which swayed the tin share market. A sharp reversal on Monday reminded the London market that the last of the Singapore forced selling has yet to be seen. But on Tuesday the East came in a strong buyer of the very stocks which it had been hastily offering on the previous day. Bewildered dealers saw no indication at all from Singapore on Wednesday and in the absence of any further demand, they marked the prices down again. Thus, Ayer Hitam dropped to 42s. after having fallen 1s. 6d. on Monday to 41s. 6d. and rallied to 43s. 6d. on Tuesday. Malayan, which had been depressed by the news that a rights issue may be needed to help pay for a new dredge, finally showed a net loss of 2s. at 26s. 6d.

Concessions currently stand at 16s. 6d. to yield 19.1 per cent. The price of Union Minière on the Brussels bourse is Frs. 142, yielding 13.1 per cent.

R.S.T. AND ROAN ANTELOPE TO MERGE

It has been announced that Roan Antelope and R.S.T. are to merge. This will involve the liquidation of Roan Antelope and forms part of a large scheme which will strengthen the cash resources of the R.S.T. group and allow it to go ahead with its plans for opening up the Chambeshi and Baluba properties.

Rhodesian Selection Trust is to consolidate its present 5s. shares into £1 shares and will then make a bonus issue of 1 for 10 on the new £1 shares. Roan holders will be given one new R.S.T. share for every eight Roan shares.

The stock market reaction to this news was to mark the Roan shares down by 6d. to 4s. 1½d. The R.S.T. shares rose by 4½d. to 8s. 6d. This movement in share prices compensates the discrepancy that exists in the offer; on the basis of the original prices 8 Roan shares were worth 37s. compared with the new R.S.T. shares at 29s. 6d. after the scrip issue.

Making the announcement the directors have said that it is anticipated that the net profit after taxation at Roan Antelope for the current year will be £2,000,000 and that of R.S.T. £3,400,000 On the basis of these figures the Roan dividend would have been 9d. per share gross and the R.S.T. dividend 1s. 3d. gross. Under the proposed arrangements, and assuming the same profit levels, the dividend on the new £1 R.S.T. shares will be 6s. gross.

The main benefit to the R.S.T. of this merger will be the large cash resources of Roan; the net current assets at the year end, June 30, 1961 were almost £8,400,000. The advantage to the Roan shareholders will be the opportunity to participate in the development of the new Copperbelt mines.

SMALL DIVIDEND COVER AT LAKE VIEW

Lake View and Star is one of the few Australian producers that does not receive a subsidy and despite the increase in the weekly basic wage rate by A13s. 2d. the profitability of the mining operations has increased marginally compared with the previous year. This has been due to several factors. The recovery grade has improved by 0.11 dwts. per ton, some £A10,054 has been received from premiums on gold sales, and a general improvement in efficiency which has substantially off-set the increased labour charges.

In his annual address, extracts from which are published on page 643, the chairman, Mr. R. H. A. Neuschild has pointed to the fact that the current rate of dividend has been maintained at A2s. 6d. for five years. That this has been possible in an industry with continually rising costs yet a fixed gold price reflects considerable credit upon the mine management. The improvements in efficiency resulting from new capital installations over the past five years have been considerable but it must be recognised that the dividend cover is now very small and any further increases in costs can only be offset by an increase in grade or the dividend rate must suffer.

During the past year the development has been very satisfactory. It has been possible to increase the total ore reserves despite the normal operating depletion and probably a further depletion due to the elimination of some of the lower grade ore due to rising costs. The tonnage of ore developed per foot advanced was 37.53 compared with 28.52 tons for the previous year. These increases are mainly due to the successful development at the Lake View mine and the proving of a new mining block on the Crown lode at the Imperial mine.

An interesting technical development has been the introduction of a heavier grade fuel oil in the company's power station. This has already shown a reduction of almost 3 per cent in power costs and further reductions are anticipated in the current year. Lake View's power station is one of the largest private stations in Australia.

On the stock market Lake View and Star has always been regarded as the best "gold-price" share outside of South Africa. Whilst this is undoubtedly true the fluctuations in share price that result following the various gold price rumours do not do the mine justice. However, realising that a reduced dividend at the close of next year cannot be wholly discounted the shares are probably reasonably valued at the current London price of 26s. to yield 9.4 per cent.

VAAL REEFS DIVIDEND INCREASED

The Christmas dividend season has continued in South Africa and the most notable declaration is that of Vaal Reefs where the final dividend has been increased to 22.5 cents bringing the total for the year to 40 cents. This increase is really no surprise. Throughout 1961 gold profits have risen very satisfactorily following the increased tonnage milled and the improvement in the recovery grade. In the September quarter 348,000 tons were milled at an average grade of 9.37 dwts. per ton.

East Daggafontein has also increased its final payment to 9 cents, bringing the total for the year to 16.5 cents, the best since 1952. On current earnings this must represent a very full payout. The dividend payments of the Anglo mines, Union Corporation and Johnnies are summarized below.

Company	*June* 1960	*Dec.* 1960	*June* 1961	*Dec.* 1961
	cents			
Dagga	20	20	20	20
E. Champ d'Or	2.5	2.5	2	2
E. Dagga . .	6.25	7.5	7.5	9
East Geduld . .	16.67	18	15	15
Geduld Prop.	33.33	36	30	30
Grootvlei Prop.	11.66	14	11	14
Marievale Cons.	15	19	15	18
Randfontein . .	12.5	17.5	17.5	22.5
S. A. Lands . .	5	5	5	5
Vaal Reefs . .	15	20	17.5	22.5
W. Reefs . .	12.5	12.5	12.5	12.5

A FURTHER LEASE OF LIFE

The Mount Ida mine which is owned by Moonlight Wiluna, a subsidiary of Gold Fields Australian Development, is by most standards a small gold mine. During the year ended June 30, 1961, some 30,215 tons were milled at an average grade of 9.14 dwts. giving a gold production of 13,378 ounces.

Several years ago it appeared that the mine was nearing the end of its life, but as is not unusual with this type of orebody further development has now revealed payable extensions. In the past, little development was done in the southern area due to the presence of a heavily faulted zone; however, recent development beyond this zone has indicated a number of payable stretches of ore between the Nos. 3 and 6 levels.

As yet it has not been possible to include this ground in the proved ore reserve but in his annual address, extracts from which are published on page 644, the chairman, Mr. R. H. A. Neuschild, has suggested that the development planned for the coming year should bring into the reserve some 77,000 tons of ore at a grade of over 10 dwts. per ton. Anticipating this reserve the company is to sink a small shaft about 1,600 feet south of the main shaft in order to improve the ventilation in the far south and to open up an additional level.

At present, the policy of the company is to treat the development ore and sufficient broken ore from the shrinkage stopes as is necessary in order to pay for the current development programme. It is anticipated that this will continue until Autumn 1962 but that thereafter a cash flow from operations will commence again. These developments are very encouraging and in fact the only disappointing feature of the report is the result of the diamond drilling below the 8th level which has indicated that there is no appreciable chance of an extension of the main orebody at depth, at least in the area drilled.

BURMA MINES

The main investment of Burma Mines is its 50 per cent holding in Burma Corporation. The year ended June 30, 1961 has been a very difficult one for Burma Corporation; quite apart from the generally low level of lead and zinc prices the No. 1 winder was out of action for a considerable portion of the year.

As a result of the winder being inoperative, the mining operations were restricted to the upper levels where assay values were lower. Over the full year the total tonnage milled is slightly in excess of the 1959/60 figure but the assays were reduced as: silver 14.02 ozs. against 16.07; lead 17.15 per cent against 19.43 per cent and zinc 9.84 per cent against 11.99 per cent.

The years operations have resulted in a net loss of £175,358 compared with a profit of £123,750 in 1959/60.

MR. MENELL AND ANGLO-VAAL

Speaking at the annual meeting of Anglo-Transvaal in Johannesburg, Mr. Menell has dwelt upon the subject of the London interest in South African gold shares. He has expressed the hope that the current increase in interest, although not yet reflected in share dealings, will precede a substantial purchasing period. As to how well founded this hope is only time can tell, but Mr. Menell has outlined what should be the main incentives to British investors. These may be summarised as, the favourable progress that has been made in restoring the country's reserves encouraging the belief that changes in the exchange control regulations will not be unduly delayed: the gold production which this year will exceed 22,000,000 ounces — a new record — and with the newer mines still at the development stage the gold production should increase for the next few years and also the fact that recommendations for a higher gold price are now emanating from many influential sources.

The generally low level of investment activity in South African stocks by British and other non-South African investors has undoubtedly been reflected in the policies of all the mining finance houses.

However, the finances of Anglo-Vaal are probably as tightly stretched as any. As a result of the conservative dividend policy—the current dividend of 30 cents seems to be covered some 2½ times—the group is a little better placed for cash now than twelve months ago but the commitments are still heavy. Anglo-Vaal Industries still has a cash deficit of R1,554,000 and the parent company has R2,000,000 debentures falling due for repayment in 1963/4. Zandpan will also be requiring additional funds.

The net assets for the ordinary shares based on the balance sheet as at June 30, 1961, with quoted investments taken at the Johannesburg market value, is R5.00. per ordinary or A ordinary share. At that date the London price of Anglo-Vaal was 26s., the current price is 32s. with a gross yield of 9.3 per cent.

NOVEMBER GOLD RETURNS

A number of the South African mines established new production records in November, but perhaps the most notable was St. Helena. The grade at Saints has reached a new record level of 7.2 dwts. per ton compared with the average for the twelve months ended December 31, 1960 at 6.8 dwts. If this high grade is maintained for December then the average over the current year will be 7.03 dwts. The increased grade resulted in a record profit level at R922,843.

At Loraine the increased proportion of Elsburgs milled has been responsible for a further increase in grade to 7.1 dwts. per ton with a consequent increase in profits. In the Gold Fields group Libanon has increased its profit level by R9,117 to R206,965.

FIRST CALL ON BANCROFT OPTIONS

Bancroft Mines have a total of 3,000,000 5s. shares under option at 17s. 6d. to Anglo American, Rhoanglo, Nchanga and Rhokana; in total some £2,625,000 could be raised if all these options were exercised.

The Bancroft expansion programme, discussed here on November 18, will require about £6,500,000 over the next three years and in his review Mr. Oppenheimer stated that the options would be exercised shortly in order to assist in the financing of this programme. It has now been announced that Bancroft has exercised its right and has called for the first 1,000,000 shares to be taken up. This has raised £875,000.

North Kalgurli.—An extract from Mr. H. A. Kemlo's annual statement is published on page 643. The most notable feature of the year has been that despite generally rising costs it has been possible to maintain the pay-limit. This, together with the other salient features, was discussed here last week.

Reynolds New Company.—Agreement has been reached on the acquisition of Aluminium Extruders, a wholly owned subsidiary of the Kruger Organization of Montreal, by Reynolds International Inc., Bermuda.

Canadian-Swiss Aluminium Deal.—The Swiss company, Diethelm & Co. of Zurich are to participate as minority shareholders in Alcan Malayan Aluminium Co., Aluminium Ltd., new fabricating subsidiary in Malaya, where construction of the new plant is in progress.

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Mr. John G. Cowen has resigned as director of Ipoh Tin Dredging as from December 6.

Rand and Orange Free State Returns for November

GOLD OUTPUT AND PROFIT

Company	Nov. 1961 Tons (000)	Nov. 1961 Yield (oz.)	Nov. 1961 Profit† (R000)	Year ends	Current Financial Year Total to date Tons (000)	Current Financial Year Total to date Yield (oz.)	Current Financial Year Total to date Profit† (R000)	Last Financial Year Total to date Tons (000)	Last Financial Year Total to date Yield (oz.)	Last Financial Year Total to date Profit† (R000)
Gold Fields										
Doornfontein	126	54,608	634·2	J	625	269,863	3154·4	525	215,823	2292·7
Libanon	119	32,045	207·0	J	595	155,022	934·1	585	139,819	700·1
Rietfontein	120	3,047	3·4	D	132	35,003	34·1	169	44,058	117·0
Robinson	53	10,012	4·4	D	507	107,827	33·5	494	109,609	37·8
Simmer & Jack	69	12,160	L 3·3	D	773	137,605	6·1	829	147,259	L75·0
Sub Nigel	66	15,260	26·8	J	332	75,741	130·3	332	75,821	80·5
Venterspost	129	39,442	213·4	J	644	195,392	1041·6	618	172,473	799·6
Vlakfontein	53	19,629	184·2	D	578	213,667	2044·0	567	204,145	1945·6
Vogels	80	17,212	23·0	D	885	190,100	390·9	939	201,234	451·8
West Drie	184	144,355	2434·9	J	910	713,279	12193·9	650	614,948	10905·1
Anglo American										
Brakpan	142	18,748	64·2	D	1,577	192,014	584·3	1,574	191,046	291·4
Daggas	227	46,021	449·0	D	2,485	502,930	4971·8	2,528	511,248	4991·2
East Daggas	109	19,207	93·2	D	1,286	203,870	951·2	11,166	197,966	917·1
F.S. Geduld	100	87,911	1426·9	S	200	175,821	2851·6	190	164,331	2698·1
President Brand	133	102,540	1718·3	S	266	205,329	3448·3	237	189,309	3353·6
President Steyn	115	42,573	323·0	S	229	85,224	658·6	213	79,322	699·2
S.A. Lands	110	23,385	100·6	D	1,196	243,115	1114·1	1,075	223,447	1024·7
Springs	100	14,436	53·5	D	1,046	149,047	460·9	1,102	152,829	314·8
Vaal Reefs	123	57,810	586·6	D	1,221	571,960	6057·3	1,093	495,418	5242·0
Welkom	111	35,553	163·1	S	218	69,844	348·9	198	63,173	322·7
Western Holdings	175	123,812	2115·3	S	350	247,187	4229·9	312	211,634	3637·4
West Reefs Ex.	153	44,900	304·6	D	1,666	485,309	3314·8	1,528	432,701	2866·6
Central Mining										
Blyvoor	142	88,146	1325·5	J	707	439,323	6625·6	674	437,517	6686·4
City Deep	116	24,254	2·6	D	1,264	271,084	45·4	1,265	258,691	116·2
Cons. M.R.	34	7,814	3·1	J	189	42,792	15·3	274	56,765	40·7
Crown	176	30,275	L15·1	D	1,973	343,859	2·6	2,004	339,546	127·6
D. Roodepoort	199	37,414	104·7	D	2,148	400,234	1121·4	2,116	386,946	1105·5
East Rand Prop.	244	59,391	240·2	D	2,614	603,204	1844·8	2,446	591,127	1811·8
Harmony	198	79,896	756·5	J	993	400,426	3843·9	840	339,356	3193·3
Modder East	67	6,089	L 5·8	J	317	31,518	L 8·6	637	61,995	1·1
Rose Deep	22	3,698	L 2·6	D	256	44,777	L 3·9	269	47,197	24·0
J.C.I.*										
Freddies Cons.	65	12,703	L36·9	D	704	144,129	L464·9	668	146,072	L844·4
Govt. G.M.A.	31	7,264	L16·9	D	414	87,389	L187·6	580	117,598	10·4
Randfontein	15	2,662	1·0	D	184	33,060	14·2	243	47,062	54·5
Union Corporation										
East Geduld	121	34,001	409·3	D	1,376	389,494	4703·8	1,444	421,909	5397·2
Geduld Prop.	73	11,757	24·1	D	853	138,025	418·7	830	143,812	563·1
Grootvlei	230	46,841	458·2	D	2,427	502,730	4938·4	2,405	499,693	5181·5
Marievale	99	23,532	237·7	D	1,085	260,249	2644·9	1,085	265,612	2801·2
St. Helena	190	68,408	922·8	D	2,031	713,709	9254·2	1,832	625,182	7855·4
Van Dyk	730	10,514	8·9	D	814	124,536	117·2	812	132,127	190·7
Winkelhaak	97	32,980	354·1	D	1,055	358,931	4866·9	973	313,315	3157·3
General Mining										
Buffelsfontein	157	69,740	780·4	J	777	342,276	3850·6	737	303,658	3326·7
Ellaton	22	5,394	26·5	D	218	51,146	268·5	309	73,178	537·2
S. Roodepoort	30	7,340	44·8	J	151	36,732	225·5	152	36,346	236·9
Stilfontein	195	86,970	914·2	D	1,989	896,051	9554·9	1,790	809,261	8680·1
W. Rand Cons.	134	19,509	23·5	D	1,483	219,251	367·8	1,458	210,290	202·1
Anglo Transvaal										
Hartebeestfontein	136	62,563	522·5	J	780	312,599	3303·4	603	280,695	3256·0
Loraine	85	30,175	113·7	S	170	59,712	260·2	162	32,600	L73·2
Rand Leases	154	23,485	3·0	J	881	124,038	L52·9	948	136,144	84·5
Village M. R.	35	4,384	L 2·5	J	181	22,073	L14·3	147	21,157	L39·9
Virginia O.F.S.	140	28,084	167·1	J	702	139,930	L41·6	591	125,411	L259·4
Others										
N. Kleinfontein	70	9,959	2·5	D	791	110,644	49·2	868	112,012	19·9
Wit. Nigel	19	4,271	3·3	J	97	21,375	30·0	100	22,170	54·5

Gold has been valued at R24·96 (October R24·96) per oz. fine. L indicates loss. † Working Profit. Table excludes profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Randfontein and W. Rand Consolidated. * Working profit includes Sundry Revenue.

ESTIMATED URANIUM REVENUE

Company	Year ends	Nov. Profit (R000)	This year (cum.) (R000)	Last year (cum.) (R000)	Company	Year ends	Nov. Profit (R000)	This year (cum.) (R000)	Last year (cum.) (R000)
Gold Fields					**J.C.I.**				
Doornfontein	J	32·0	158·0	150·0	E. Champ d'Or(*b*)	D	9·0	103·2	146·9
Luipaards Vlei (*a*)	J	263·0	1,329·0	952·3	Freddies Cons. (*b*)	D	67·0	718·0	728·0
Vogels	D	105·0	1,191·0	1,191·0	Govt. G.M.A.‡	D	30·0	401·9	506·8
West Drie	J	105·0	517·0	490·0	Randf'ntein (*b*) (*c*)	D	279·8	3,064·2	2,296·8
Anglo American					**General Mining**				
Daggafontein (*b*)	D	261·0	2,820·0	3,095·2	Buffelsfontein (*d*)	J	251·2	1,268·9	2,112·0
P. Brand (*b*)	S	91·0	183·0	170·3	Ellaton (*d*)	D	3·5	40·7	370·0
P. Steyn (*b*)	S	127·0	256·0	235·2	Stilfontein (*d*)	D	10.8	283.8	1,946·0
Vaal Reefs (*b*)	D	162·0	1,643·8	3,113·2	W.R. Cons. (*d*)	D	193·6	3,049·4	4,555·6
Welkom (*b*)	S	119·0	239·0	223·6					
West Reefs Ex. (*b*)	D	107·0	1,111·2	3,556·1	**Anglo Transvaal**				
					Hartebeestf'tein(*d*)	J	207·5	1,931·5	2,458·0
Central Mining					Loraine (*d*)	S	34·8	104·3	136·0
Blyvoor (*b*)	J	150·0	786·0	1,612·0	Virginia O.F.S. (*d*)	J	150·6	1,244·9	1,740·5
Harmony (*b*)	J	350·4	1,891·8	3,537·6					

Table includes profit from uranium, acid and pyrite, before loan redemption. (*a*) Including profit from gold section. (*b*) Including royalty provision. (*c*) Total profit from uranium section. (*d*) Excluding royalty provision. * Net revenue. † Uranium royalty received. ‡ Pyrite.

NORTH KALGURLI (1912) LIMITED

MR. H. A. KEMLO ON CONTINUITY OF POWER SUPPLIES

The Annual General Meeting of North Kalgurli (1912) Limited was held on December 13 at Winchester House, Old Broad Street, London, E.C., **Mr. H. A. Kemlo,** the chairman, presiding.

Mr. S. L. Crawford, the Secretary, read the notice convening the meeting and the report of the auditors.

The following is the statement by the chairman which had been circulated with the report and accounts for the 52 weeks ended March 28, 1961 :—

During the year 1960-61 we treated 372,717 tons of normal run of ore to produce 88,508 ounces of gold against 367,511 tons of ore for 87,030 ounces in the previous year. Treatment of stored concentrates produced 1,094 ounces against 3,141 ounces in the previous year. Gross mining income, after allowing for reduction of concentrates stocks, was practically the same at £1,105,706 against £1,102,780. Mining and treatment costs were contained at approximately the same level per ton of ore treated as in the previous year, an achievement for which the Management deserve great credit, and we came out with a net profit of £160,880 against £169,215. It is proposed to pay, as last year, a final dividend of 6*d.* a share, making 10½*d.* for the year.

There is no significant change in the Balace Sheet apart from an increase in our liquid resources from £247,110 to £314,826. We shall need most of this money for our new Power Plant to which I refer later.

Mine Development

The overall development scope on the Mine appears to be quite sound, both for immediate and long-term prospects. During the year 15,231 feet of development work was carried out over a large number of ore bodies on the Main, Kalgurli, and Croesus workings, and details of the principal results obtained have been given in the Quarterly Development Reports. The aggregate footage in ore of payable grade amounted to 3,862 feet or 25.4 per cent. of the total. Both lateral development on extensions of known ore bodies and new work on the lower mine horizons have proved additional pay shoots, of particular interest being those at Main Shaft Nos. 6 and 13 Levels, No. 3 Cross Lode, and No. 14 Level the Tyrrell Lode, whilst on Nos. 17 and 18 Levels good lengths of ore were developed on the East Lodes, and at the Kalgurli Shaft the Iron Duke Lode was developed on No. 11 Level and Kalgurli Main Lode at No. 18 Level, all in profitable ore, and the high-grade Cross Lode on No. 22 Level was further developed. Developments in the Croesus Section have been rather disappointing.

Power Plant Installation

Last year I said that a scheme for the modernization of the Kalgoorlie Power Corporation's Plant was under negotiation between us and the Power Corporation and the other mining company which takes its supplies of electricity from the Power Corporation. These tripartite negotiations came to nothing, and early this year we decided that we must go ahead with the installation of our own Power Plant because we could not take the risk of being left as the sole customer of the Power Corporation, being obliged to take supplies of power at what would necessarily become a prohibitive cost. In July we placed an order for the generating plant with Hawker Siddeley Brush International Limited and an order for the switchgear with the General Electric Company Limited, and we expect deliveries on site to be completed by June of next year. Meanwhile work on the foundations and buildings is in hand, and the Plant ought to be in operation well before the end of 1962. The total cost is likely to be in the neighbourhood of £275,000. We expect to achieve a substantial saving in power costs and, even more important, assured continuity of power supplies. It gives me great pleasure to record that we are receiving every co-operation from the Board and Management of the Power Corporation during this transition period.

On February 28, 1961, we lost by death our Chief Engineer, Mr. Nowland, senior. He was a man of outstanding character and worth, who is greatly missed on the Mine. We have been happy to appoint as his successor, his son, Mr. L. S. Nowland, who was with us as Chief Electrical Engineer.

The report and accounts were adopted and the dividend, as recommended, was approved.

The retiring director, Mr. H. A. Kemlo, was re-elected and the remuneration of the auditors, Messrs. Barton, Mayhew and Co., having been fixed the proceedings terminated.

LAKE VIEW AND STAR

MR. R. H. A. NEUSCHILD'S SPEECH

The Fifty-first Annual General Meeting of Lake View and Star Limited was held on December 7, 1961, in London.

Mr. R. H. A. Neuschild (the Chairman) in the course of his speech, said :—

The results of the Company's operations for the year ended June 30, 1961 are not unsatisfactory. When one analyses the technical aspects there is much to supplement the satisfaction of again being able to recommend a final dividend of 1s. 6d., making a total of 2s. 6d. for the year. This rate of dividend has now been paid for five years and for eight out of the last twelve years.

The results reflect great credit on our General Manager in Australia, Mr. R. C. Buckett, and the mine organization, a body of some 1,000 men.

Because the Company has been working for over fifty years it does not mean that every operation has become one of monotonous repetition. Far from it! Were that the attitude, with ever rising cost of services and commodities we should not be in a position to recommend the same dividend today. That has only been possible by the continuous striving after improvements which are reflected in costs and earnings.

Costs have increased by 6d. to 43s. 10d. per ton. This represents a total increase of approximately £19,000 for the year and would have been greater but for the operating improvements which have been effected and which tend to get overshadowed in their extent by the increase in costs being thereby restricted to the figure mentioned.

We are reaping full benefit from the heavy capital expenditure which we have incurred during recent years—it is, in fact, £590,000 since 1954. All of this expenditure has been financed out of the Company's own resources.

Production and Ore Reserves

Production of gold from mining operations at 166,122 ounces was slightly up on the previous year's figure and is still the highest production from any one gold mining operation in Australia.

The results of development work during the year were good and continue to be so. The tonnage of new ore developed per foot of work done, excluding "dead work", at 37.5 tons was, in fact, over 30 per cent in excess of the figure for the previous year.

Ore reserves at June 30, 1961 were 3,688,000 tons. With 763,000 tons mined during the year this indicates that new ore developed or brought into reserve during the year amounted to over 900,000 tons. This excellent result is a tribute to the mining and geological staff responsible, particularly as the new tonnage includes some "better than mine average grade" ore.

The tonnage of ore in reserve at June 30, 1961, represents approximately 5 years' milling tonnage at the present rate.

Metallurgical extraction has again been good and in fact shows an improvement over the previous year.

In the power house a major innovation was introduced by the decision to use a heavier grade of oil fuel in place of the more expensive lighter oil, previously used. The benefit to be derived from the lower cost of the heavier oil is already reflected to a limited extent in the lower cost per unit produced.

The profit from mining operations amounted to £400,672 which is just fractionally higher than last year. In addition, our net income from sources other than mining amounted to £19,696, in respect of which the U.K. tax liability will amount to approximately £10,000.

After the provision for depreciation, U.K. taxation liability and dividends the balance a profit and the year's operations amounted to £12,254. We have transferred a total of £80,000 to general reserve, made up of the whole of the unappropriated non-mining profits of £27,418 and £52,582 from unappropriated mining profits. The general reserve is now £650,000 and the balance of mining profits carried forward £37,658.

The Lake View and Star Mine as an enterprise is quite a substantial undertaking and a very impressive one at that. It is a comprehensive entity where efficiency, ingenuity and team spirit combine to produce such a successful and well run mine.

We have not much margin to play with in maintaining the rate of dividend, which has represented a distribution very much up to the hilt for some years. Our problem is whether we can effect savings to balance increases in costs, because with the fixed price for gold this is virtually the only way we can maintain the level of profits. Therein lies the implication for the future.

The report and acounts were adopted.

An exhibition of specialized British equipment is being arranged to be held in Bucharest, Rumania, from September 30 to October 12, 1962.

The International Spring Trade Fair will be held in Utrecht from March 12-20, 1962.

GOLD FIELDS AUSTRALIAN DEVELOPMENT

The Twenty-eighth Annual General Meeting of Gold Fields Australian Development Company Limited was held on December 12 in London.

Mr. R. H. A. Neuschild, the Chairman, in the course of his speech, said :—

It was not so long ago that we were thinking in terms of the Mount Ida mine being worked out by this time. Now, the success which has been achieved by the vigorously carried out exploratory and development campaign enables us to look ahead for a few years, at least.

Mount Ida is not a large mine. In fact the highest ore reserve declared since milling recommenced in 1950 was 130,000 tons averaging 9.18 dwt. at December 31, 1952, and the total tonnage milled between 1950 and June 30 last was 340,273 tons for the production of 158,314 oz. of gold. From that production we have been able to repay £400,000 of capital and show group net cash assets at June 30, 1961 of £165,154.

Although the development done to date is generally insufficient to bring tonnage into the " Proved Ore Reserve " category, there is every probability that some 77,000 tons of over 10 dwt. ore will be brought into ore reserve by development next year.

Before the completion of development, only tentative estimates of profitability can be made. We hope, however, to continue breaking even till the Autumn of 1962 when a cash flow from operations should again commence.

In the past the quarterly results have been published only in the Press. In future, beginning with the March quarter 1962, we shall circulate these to all Shareholders with a brief indication of the progress of development work.

It is particularly pleasing that the work of our staff headed by Mr. E. B. Mundle, our General Manager in Kalgoorlie and by Mr. W. J. Hinchliffe who is in charge at the Mine, has produced results and I trust I may convey to them, on your and our behalf, appreciation of their fine efforts.

The report and accounts were adopted.

BURMA MINES LIMITED

reports that the operations of

BURMA CORPORATION (1951) LIMITED

for the year ended June 30, 1961, resulted in an estimated **Net Loss** of **K.23,38,100 (£175.358)** as compared with a **Net Profit** of **K.18,95,949 (£142,196)** for the previous year (after providing **K.16,50,000 (£123,750)** for Taxation). After allowing for over-provisions in previous years in respect of Taxation, Provident Fund and Leave Pay Reserves aggregating **K.5,45,621 (£40,922),** the debit balance carried forward in Appropriation Account is **K.14,46,406 (£108,480).**

Details of Revenue, Expenditure, Ore Extraction and Production may be obtained from Central Registration Limited, 9, Basinghall Street, London, E.C.2, upon application.

ANGLO-TRANSVAAL CONSOLIDATED INVESTMENT COMPANY

STRONG GROUP ASSET POSITION

The twenty-eighth annual general meeting of the Anglo-Transvaal Consolidated Investment Company, Limited, was held in Johannesburg on Friday, December 8, 1961.

Mr. S. G. Menell, the Chairman of the Company, presided, and in the course of his address to members said :

The Consolidated Profit and Loss Account shows revenue of R2,955,000 of which almost half came from dividends received. After deducting interest paid, depreciation on fixed assets, expenditure on exploratory work and providing for taxation, the net profit was R2,012,600.

We provided R700,000 for depreciation of our investments and also R76,000 for the reserve for exploration. Dividends at the same rate as last year accounted for R1,309,200. The Consolidated unappropriated profit carried forward was R1,339,600 against last years figure of R1,413,400. Your Board has decided that in future consideration will be given to the payment of interim dividends.

The strong position of the Group is reflected in the Net Asset figure of R14,841,400 as shown in the Balance Sheet, which is represented by the parent Company's total Issued Capital of R5,901,800 and Revenue Reserves amounting to R8,939,600.

Renewed London Interest in Gold

In the past year far-reaching constitutional changes have occurred in South Africa. The country has adopted a Republican form of government and is no longer a member of the Commonwealth. These changes were coupled with an increased loss of confidence on the part of the overseas investor with the consequent drying-up and withdrawal of capital, which has only been stopped by the imposition of severe restrictions by the Government.

The favourable progress made here in restoring the country's reserves gives ground for encouragement in the belief that modifications in the Exchange Control Regulations will not be unduly delayed.

There is in London a renewed interest in the behaviour of South African gold shares, an interest apparently in converse ratio to the amount of share dealing, although there has recently been a certain amount of buying from American and European sources. This interest is well founded and I hope it precedes substantial purchasing, for South Africa is still a good field for investment and offers great potential. Gold production will this year exceed 22 million fine ounces—a new record—and indications are, since new mines have yet to come into full production, that the amount of gold produced over the next few years by South Africa will steadily increase.

Attractive Yields on Gold Shares

Apart from the incentive to the overseas investor of high dividends and attractive yields there is the further favourable feature associated with South African gold shares that development work at most mines is several years ahead of the mill and this provides advance information about the ore available for milling for as long as five years or more ahead.

It is encouraging to note that recommendations for a higher gold price are now emanating from many influential sources and that there are frequent reports that the volume of private gold hoarding is progressively increasing.

The political unrest which has affected so many parts of Africa in the past year has had no disturbing repercussions on the industry's African labour force. Rather has there been a tendency for the native tribesmen to flee from areas where changes have occurred, and to seek work on the gold mines, where they are offered an ordered and protected way of life and enabled to earn money to remit to their families.

Furthermore, our country's sound economy has been demonstrated by the manner in which South Africa has weathered the recent financial crisis.

Since the end of World War II, South Africa has undergone a phenomenal growth. The last few years, however, have brought a slowing down of the rate of our expansion due in some cases to the play of economic forces, but most of it due to a hesitation on the part of consumers and investors here and overseas.

Prospecting in El Salvador

The College of Geology, a faculty of the University of Bahia, El Salvador, has given some information on projects currently being undertaken or planned.

During July 1962 a group of six students worked on a programme of geochemical prospecting in the copper district of Caraiba, Bahia. Over 2,500 soil and plant samples were collected and sent for analysis to the laboratory of the Institute of Chemistry, Bahia University. The results of this work, which are to be published about the middle of 1962, will be used for a much larger geochemical prospecting project on a regional basis.

Various organizations will collaborate on this programme, including the Brazilian Geological Survey (D.N.P.M.-D.G.M.), the College of Geology and the Institute of Chemistry of Bahia University. Field work is to be resumed in some areas in January 1962. A two-year programme is to be undertaken in an area east of the Rio Sao Francisco, in Bahia State, over a region covering about 300,000 sq. Km. The object of this search is to locate mineralized areas, chiefly sulphides, in the State of Bahia where several occurrences of base metals are known to exist.

ALLUVIAL MINING

Required by large organization for SIERRA LEONE, person experienced in alluvial mining and prospecting. Write with details of experience and references to Box "S.L." c/o J. W. Vickers & Co. Ltd., 65 London Wall, London, E.C.2.